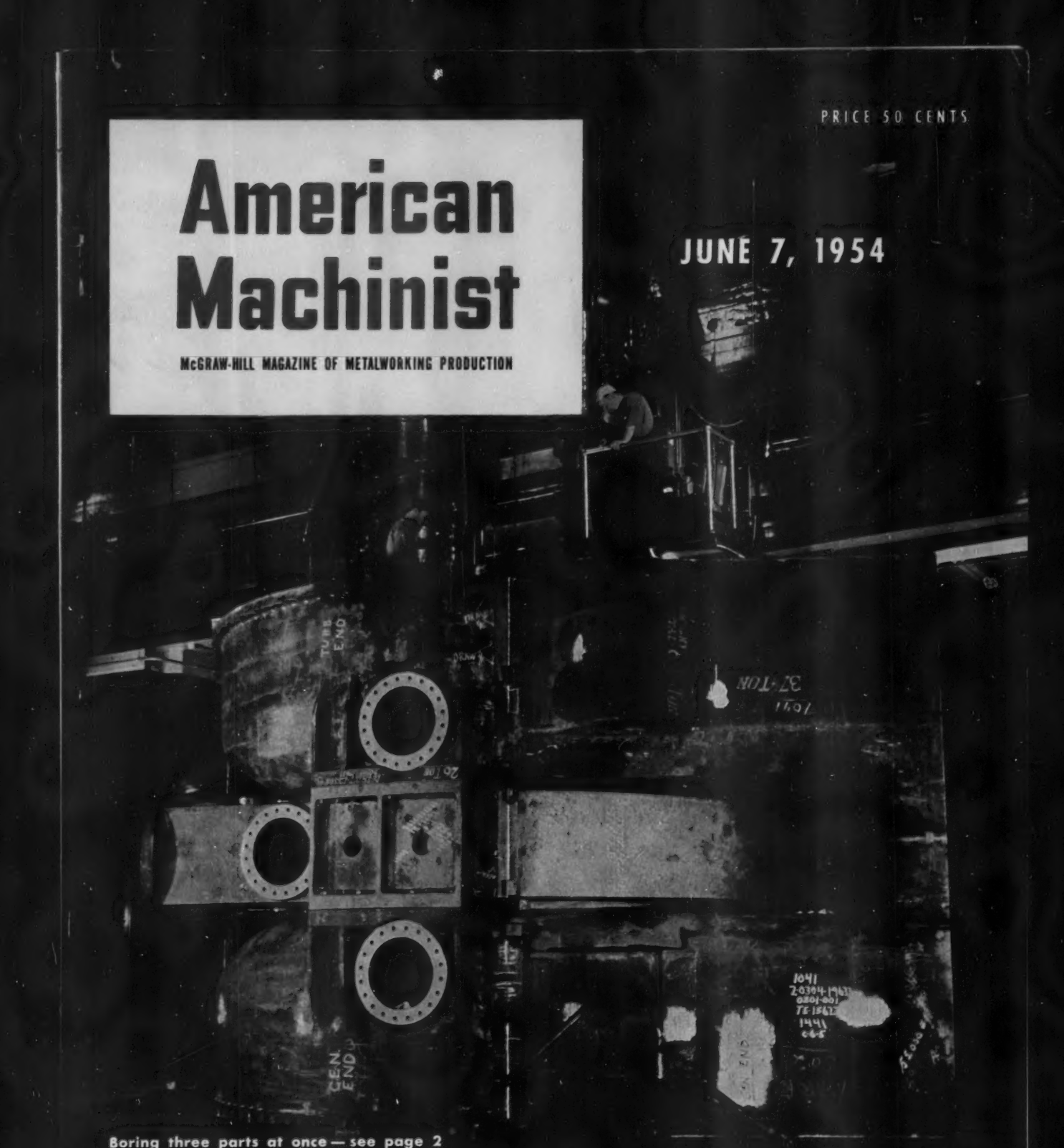
PRICE 50 CENTS

American Machinist

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION

JUNE 7, 1954



Boring three parts at once — see page 2

Production Tooling for the Small Shop

Better Handling in a Multi-Story Plant

for want of a horse the smith was lost

THE blacksmith shop was a busy place . . . when horsepower came "on the hoof". But when the first gasoline engine coughed and sputtered into life, the days of the village blacksmith were numbered.

That's progress. Spurred on by competition, it spells success for some things, obsolescence for others.

In today's highly competitive market the search for *new* and *better* methods of production is an urgent one. It's a problem that calls for fresh thinking and sound experience.

When it comes to precision finishing, we would like to show you how Heald engineering and the latest Heald equipment can help you build a better product at lower cost. New developments in automation, way-type and transfer Bore-Matics, interchangeable tooling and internal grinding methods may well be the answer to your particular problems.

Competition is wonderful when you're *ahead* of it. Our business is to keep you there. That's why IT PAYS TO COME TO HEALD.

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American Machinist

MAGAZINE OF METALWORKING PRODUCTON

CONTENTS FOR JUNE 7, 1954

VOL 98, No. 12

ADMINISTRATION

127 EDITORIAL *Burnham Finney*
153 MUFF 'N STUFF *Round Table*

SPECIAL REPORT

145 THERMAL NUMBER MEASURES EFFICIENCY OF METAL CUTTING *Kenneth J Trigger*

ENGINEERING

142 SHEET METALS CAN BE MADE FROM METAL POWDER *W D Jones*
156 EXPOSE GREMLINS . . . With HIGH-SPEED PHOTOGRAPHY *Lyell C Tullis*

ASSEMBLY

154 NICKEL-PLATE ALUMINUM FOR SOLDER JOINING *William M Stocker Jr*

MATERIAL CUTTING, FORMING

134 IRON SHELLS TO GET ACCURATE DIAMETERS OR FINISH *Stanley R Cope*
157 KICK PRESS SPEEDS RIVET-CUTTING *Stanley Wencek*
160 FORMULA AIDS SPRING-WINDING *Federico Strasser*
163 BELT GRINDING OF TITANIUM

MATERIALS HANDLING

129 NEW WRINKLES FOR AN OLD PLANT *Robert Sheets*
158 BICYCLE SPROCKETS HELP SMALL CRANE MOVE FREELY *Bert Goldrath*

TOOLING

138 BIG PLANT TOOLING . . . IN A SMALL SHOP *George H DeGroat*
157 INGENIOUS HOLDING METHOD HELPS MILL HELICAL GROOVE *A Vetsch*
157 SPLIT COTTER PINS DO VARIETY OF JOBS *Thomas H Duffy*
158 MOUNTING FOR LOCATING-BALL *Chris Stougaard*
158 SHORT DOWELS SIMPLIFY FIXTURE DISASSEMBLY *John N Schwartz*
159 ADJUSTABLE ROLLERS SPEED CORRUGATION-FORMING *H Dahl*
159 FIVE-STATION PROGRESSIVE DIE FORMS AND CUTS OFF CAPS *S E Olson*
160 EXTENSIONS ADDED TO DRILLHEADS SPEED PLATE-DRILLING *Henry George*

NEWS OF METALWORKING

113 SPOT NEWS
115 WASHINGTON
117 DETROIT
119 MACHINE TOOLS
123 GAGING METALWORKING
170 NEWS OF METALWORKING

DEPARTMENTS

106 BACKLASH
144 TIPS FOR TOP SHOP MEN
157 PRACTICAL IDEAS
163 REFERENCE BOOK SHEETS
169 TALKING SHOP
182 EQUIPMENT, MATERIALS, PARTS
268 NEW BOOKS

NUMBER OF COPIES PRINTED THIS ISSUE 36,826

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American Machinist is indexed regularly in the Engineering Index and the Industrial Arts Index

American Machinist, published bi-weekly by McGraw-Hill Publishing Company, Inc. James H McGraw (1860-1948), Founder.

EXECUTIVE, EDITORIAL, ADVERTISING AND PUBLISHING OFFICES: McGraw-Hill Building, 330 West 42nd Street, New York 36, N. Y. Donald C McGraw, President; Willard Chevalier, Executive Vice President; Joseph A Gerardi, Vice President, Treasurer; John J Cooke, Secretary; Paul Montgomery, Senior Vice President, Publication Division; Ralph B Smith, Vice President and Editorial Director; Nelson Bond, Vice President, Director of Advertising; J E Blackburn Jr, Vice President, Director of Circulation.

SUBSCRIPTIONS: Address correspondence to American Machinist-Subscription Service, 330 West 42nd Street, New York 36, N Y. Allow one month for change of address. Subscriptions are solicited only from production executives and engineers in the metalworking industries. Position and company connection must be indicated on subscription orders.

Single copies, 50c. Subscription Rates—United States and possessions, $5 a year, $8 for two years, $10 for three years. Canada $7 for one year, $11 for two years, $14 for three years. Pan-American countries, $15 for one year, $25 for two years, $30 for three years. All other countries $25 for one year, $40 for two years, $50 for three years. Entered as second-class matter, November 17, 1953, at the Post Office at New York, N. Y., under the Act of March 3, 1879.

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ABC ABP

chips

3-IN-1 . . . Our cover picture shows a rather unusual boring operation on the clearance surfaces of stationary blade shrouding in the entire 186-ton blade-carrying assembly of a low-pressure turbine for a 125,000-kw cross-compound steam turbine. This assembly could not be loaded on the 40-ft mill at Allis-Chalmers at once. So it is composed of a center plate-steel section sandwiched between two large cast sections, and each of these is divided into upper and lower halves at the turbine horizontal joint.

Each of six "half" sections, therefore, could be loaded on the front half of the mill table and the table revolved 180° to take its partner. All parts were bolted and aligned before the assembly was machined. Disassembly from the mill took place in reverse order.

THERMAL NUMBER . . . After some diligent dogging of footsteps, we finally pinned Prof Ken Trigger (see biog) down. The result is an 8-page Special Report on machinability, explaining the relationship of speed and feed. There's only one formula and that's on the first page. Thereafter, it's all straightforward and factual for your easy application, and a good addition to the material we've previously brought you on the subject.

OLD PLANT, NEW LIFT . . . Brown & Sharpe, growing like Topsy in the middle of Providence, is feeling the squeeze. To get elbow room in the plant, and to cut production costs at the same time, an extensive planning study has been made of materials handling. What it accomplished—and how—is the subject of our lead article in this issue.

RUB OFF . . . Some of the big-plant methods that characterize auto production have rubbed off on a small plant, Federal Industries, in Detroit. George De Groat, our technical eye in Detroit, tells how Federal produces a hydraulic-transmission pump with all the big-plant tricks—high-production tooling, conveyors, quality-control charts, inspection and testing machines.

DIRECT PLATING . . . Ford Instrument is plating aluminum directly onto nickel, permitting easy soldering and hermetic sealing of the aluminum without the necessity of 2-metal plating. It's new and tricky and helpful if you're working aluminum.

SEEING EYE . . . Gilman Engrg had a problem with a machining operation. Something was wrong, but the operation was over so quickly that visual observation wouldn't expose the trouble. So high-speed movies, in slow-motion, prompty revealed it. It's a fast page.

COMING . . . June 21 *AM* will include a Special Report, from Fairchild Aviation, showing how processes are evaluated for savings. There'll be a cover showing a new type of non-machining job, articles on grinding and on drilling titanium, on practical tooling with air, on belt grinding, and on using a plastic mass in a die or fixture—another Russian trick. There are several other features, too, but they're what Macy's calls "unadvertised specials"—you have to open the magazine to find out.

RESEARCHER . . . Kenneth J Trigger received his BSME from Mich State in 1933, his MS in '35, and his ME in '43. From 1935-38, he was an instructor at Mich State, Swarthmore, and Lehigh, then became an asst prof at University of Illinois, Urbana. He is now professor of ME there. He has teaching and research experience in physical metallurgy, production engrg, metal cutting, and machinability of metals, is a consultant on metal cutting and other fabrication, has written a number of papers on metal-cutting research. He is a member of ASME, ASM, ASTE, ASEE. The current Special Report on thermal numbers is his latest.

New 2 GLEASON TESTERS

For COMPLETE CHECKING ✓ of Small Gears

NO. 104 SPUR GEAR TESTER
for spur, helical, and internal gears up to 4½" center distance.

✓ *A ROLLING TEST for composite error, recorded in chart forms.*

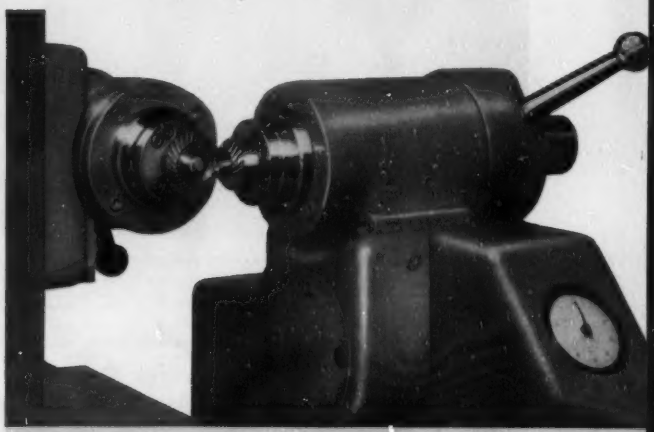
✓ *A RUNNING TEST under actual operating speeds and loads.*

For complete inspection of all small gears, use both types of test. The recorded rolling test shows an exact measurement of total error, including profile, spacing, and eccentricity effects. The power running test shows how the gears perform under actual operating conditions, and permits visual inspection of tooth contact pattern.

Note these provisions for making both types of check *on the same tester:*

For the RECORDING TEST
- 1/50 HP drive at 7.2 RPM
- Pressure between gears adjustable by 4 oz. increments, up to 5 lbs.
- Detachable electronic recorder with 5-stage variable magnification

For the RUNNING TEST
- ¼ HP drive
- Drive spindle speeds up to 14,000 RPM
- Precise load control by electric braking



NO. 104 ANGULAR HYPOID TESTER
for bevel and hypoid gears up to 4¼" diameter.

***WRITE FOR FULL INFORMATION** on how these new testers will improve your small gear inspection.*

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BUILDERS OF BEVEL GEAR MACHINERY FOR OVER 85 YEARS
1000 UNIVERSITY AVE. · ROCHESTER 3, NEW YORK

GLEASON

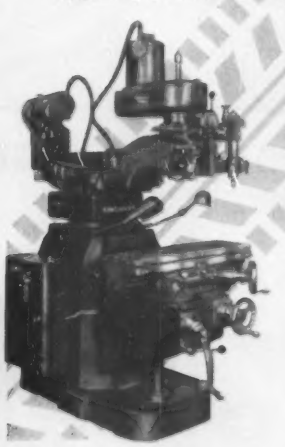
Ideas are where you

. . . and you may find a good idea in this rubber mold setup

Meticulous, demanding die sinking operations are transformed to automatic, carefree operations with the Power Driven Duplex Rotary Table Attachment mounted on a CINCINNATI 8" x 18" Tool and Die Miller.

Notice how the cutter spindle and tracing head of the CINCINNATI 8" x 18" Tool and Die Miller at the right are swiveled to the most advantageous tracing and cutting position. The head can be swiveled right and left, forward and back, around a pivot approximately at the end of the cutter. Does this give you an idea? Notice the extra large cutting range evident from this setup; it's actually 8" x 18" in one setting. Does this give you an idea? Notice the power driven Duplex Rotary Table Attachment; it rotates the master and work (mold) at the same speed under the cutter and tracing finger. Does this give you an idea? There are many exclusive advantages of the CINCINNATI 8" x 18" Tool and Die Miller that you can translate into useful and profitable ideas for producing dies and molds, and for toolroom milling. Brief data on these machines will be found in Sweet's Machine Tool Catalog; complete information may be obtained by writing for catalog No. M-1731.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO

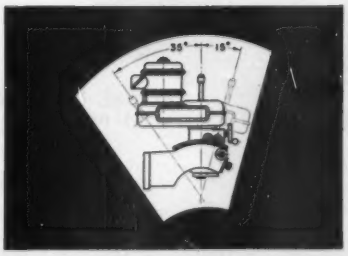


CINCINNATI 8" x 18" Tool and Die Milling Machine. Brief specs. in Sweet's Machine Tool Catalog. Complete information in catalog No. M-1731.

CINCINNATI

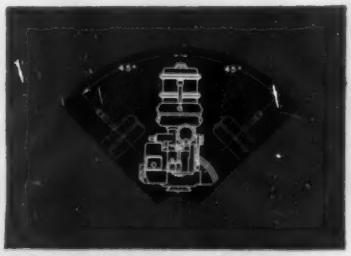
find them

Milling the tread in a tire mold. The machine is a CINCINNATI 8" x 18" Tool and Die Miller, equipped with a power driven Duplex Rotary Table Attachment.



◀ Transverse swivel range of spindle

Longitudinal swivel range of spindle ▶



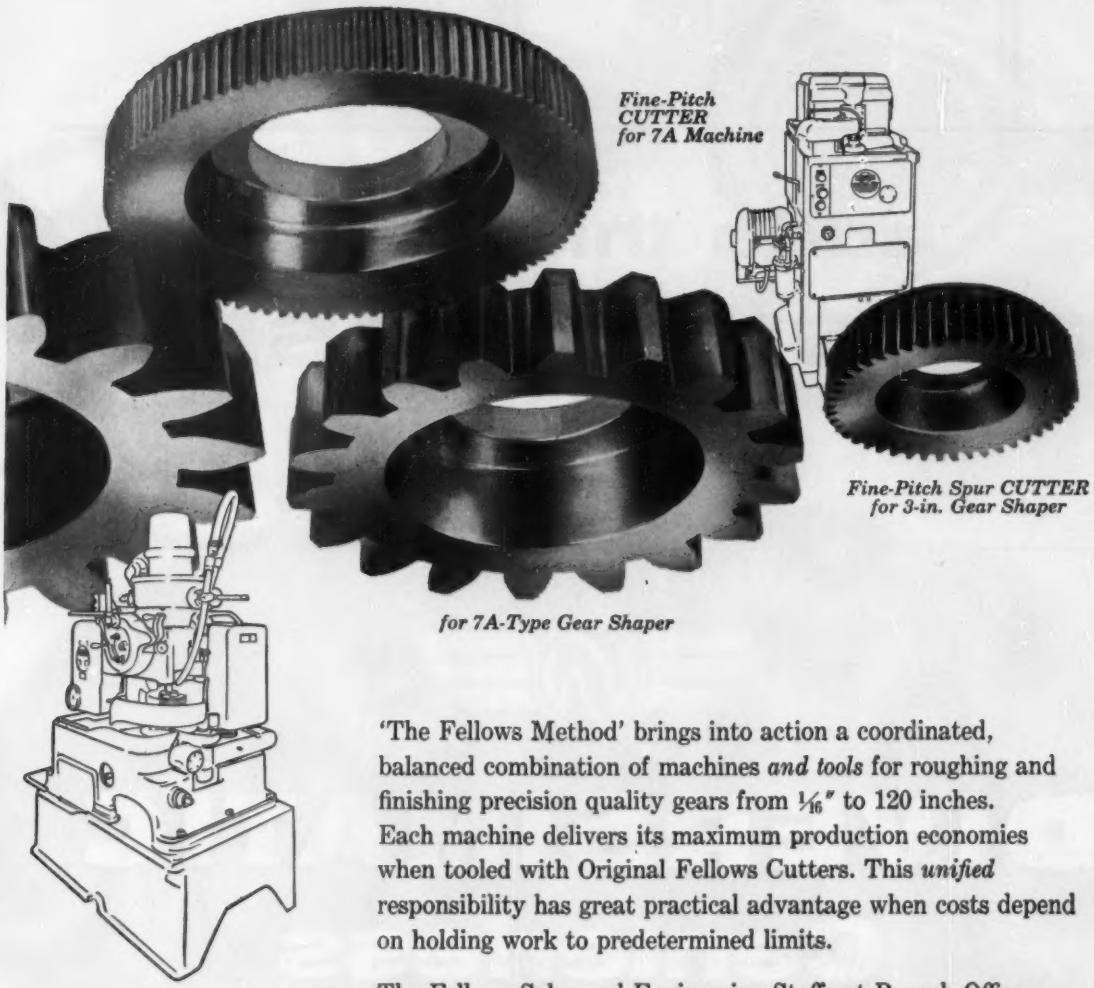
CINCINNATI

MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING MACHINES • FLAME HARDENING MACHINES OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

THE *Fellows* LINE OF

MACHINES AND TOOLS

delivers Quality Control *in All Sizes...*



Fine-Pitch CUTTER for 7A Machine

Fine-Pitch Spur CUTTER for 3-in. Gear Shaper

for 7A-Type Gear Shaper

'The Fellows Method' brings into action a coordinated, balanced combination of machines *and tools* for roughing and finishing precision quality gears from 1/16" to 120 inches. Each machine delivers its maximum production economies when tooled with Original Fellows Cutters. This *unified* responsibility has great practical advantage when costs depend on holding work to predetermined limits.

The Fellows Sales and Engineering Staffs at Branch Offices and at Headquarters are men of broad experience and practical skill in helping customers combine specified accuracy with close control of costs. All Fellows Offices are at your service.

THE FELLOWS GEAR SHAPER COMPANY

Head Office & Export Department: 78 River Street, Springfield, Vermont
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Now... Van

adds this new CRUSH-DRESSER to the

VAN NORMAN

Manufacturers of — Ram and Column Type Milling Machines, Cylindrical Grinders, Spline Grinders, Oscillating Radius Grinders, Special Production Grinders, Centerless Grinders.

Norman

Work Size 0-1½' Diam.
Grinding Wheel 14" O.D. x 4" Wide.
Regulating Wheel 8" O.D. x 4" Wide.
Can be used for standard thru-feed and infeed centerless grinding. Automatic cycle optional.

Here's a new Van Norman development that increases the scope of centerless grinding operations . . . the Crush-Dresser attachment.

Many small, formed parts and multi-diameters can be ground direct from the solid on the Diversimatic with the Crush Dresser Attachment. It dresses the wheel to the desired contour and holds the form hundreds of pieces between wheel dressings, imparting the exact profile to the work. Also finish grinds rough-turned parts. Grinds faster, holds tolerances, cuts costs. Write for full details about the Diversimatic, today.

COMPANY

SPRINGFIELD 7,
MASSACHUSETTS, U.S.A.

THE NO. 32C

for Cutting Large

•HARDENED and 60%

LANDIS *Machine* CO.

WORLD'S LARGEST MANUFACTURERS OF THREAD

LANDMACO

Diameter Threads—

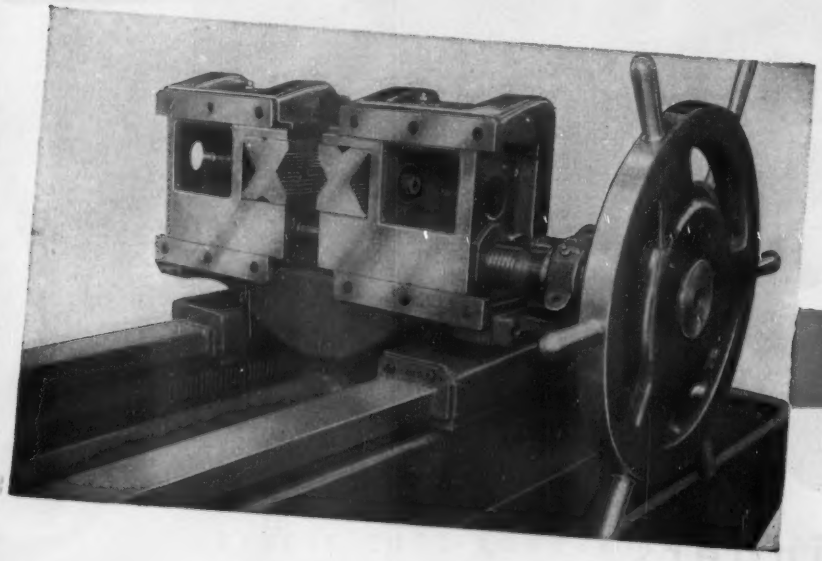
GROUND WAYS • WIDE SPEED RANGE
MORE GRIPPING POWER • 6" CAPACITY

A new LANDMACO Threading Machine with many improvements and new design features has been developed for heavy-duty precision threading on large diameter work. The first installation of this new LANDMACO is shown threading "Unbrako" Screw Products of TS4140 steel at the Standard Pressed Steel Company, Jenkintown, Pa. 1½" diameter 12 pitch UN threads are being cut 2 29/32" long to a Class 3 fit.

The carriage front, based on a new principle, assures proper work alignment under gripping pressure and gives 60% more gripping efficiency. Heavy hardened and ground rectangular ways firmly guide and support the carriage.

A single gear shift lever is provided for a rapid speed change of 25% for any given spindle speed as determined by the speed change gears in use. Three pairs of speed change gears provide twelve spindle speeds ranging from 9 to 152 revolutions per minute.

This machine is equipped with either the 4" Standard Rotary Head or the new 6" (6-chaser) Lanco Head. It will cut bolt threads from 1½" to 6⅝" in diameter, and pipe threads from 1" to 6" in diameter. Maximum thread length is 29" with leadscrew and 30" without leadscrew.



This machine is also available in a Double-Spindle model with a 7½" carriage travel for pipe and nipple threading. For more information on the 32C and 48C Landmaco Threading Machines, write for Bulletin H-45.

LANDIS REG. U.S. TRADE—MARK PAT. OFF.

WAYNESBORO
PENNSYLVANIA

GENERATING EQUIPMENT

Electrolux Increases Armature

Landis 4" Plain Grinders replace equal number of older machines

Here is another example showing how Landis grinders have improved production and lowered costs.

Armature shafts at Electrolux were formerly ground on older machines which required time-consuming hand operations. The new Landis 4" type H plain

Landis 4" Type H Plain Grinder

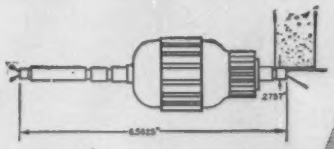
LANDIS

precision grinders

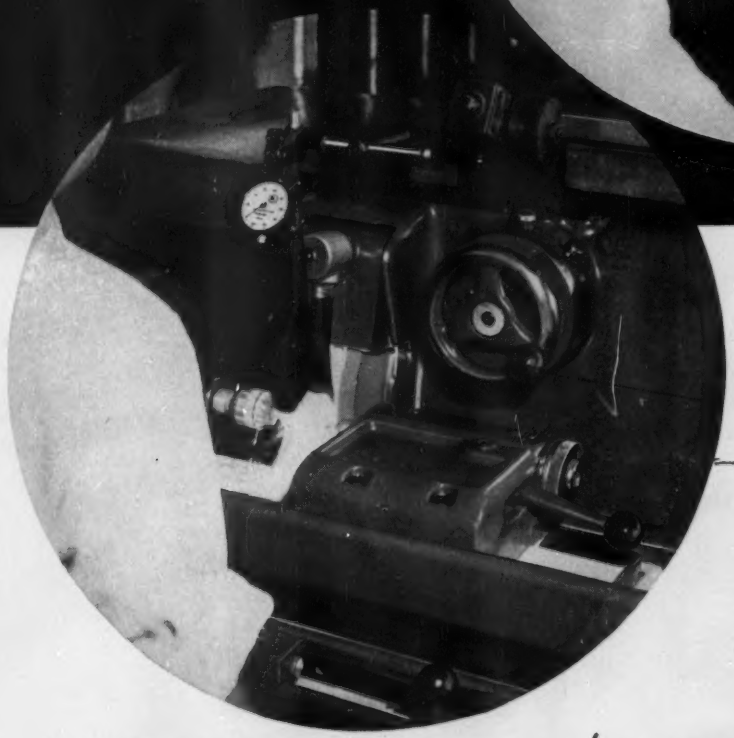
Grinding Output 40%

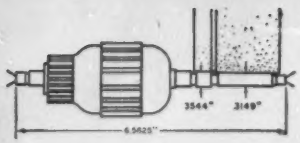
grinders with hydraulically operated rapid wheelbase movement, slow grinding feed, timed cycle and visual sizing gauges have made these gains possible.

Whatever your grinding problem—our engineers will be glad to make production estimates and tooling suggestions from your work prints.



work data	
PRODUCTION	350 pieces per hour
OPERATION	grind small bearing
STOCK REMOVAL	.012" to .015"
TOLERANCE	.0002" on diameter



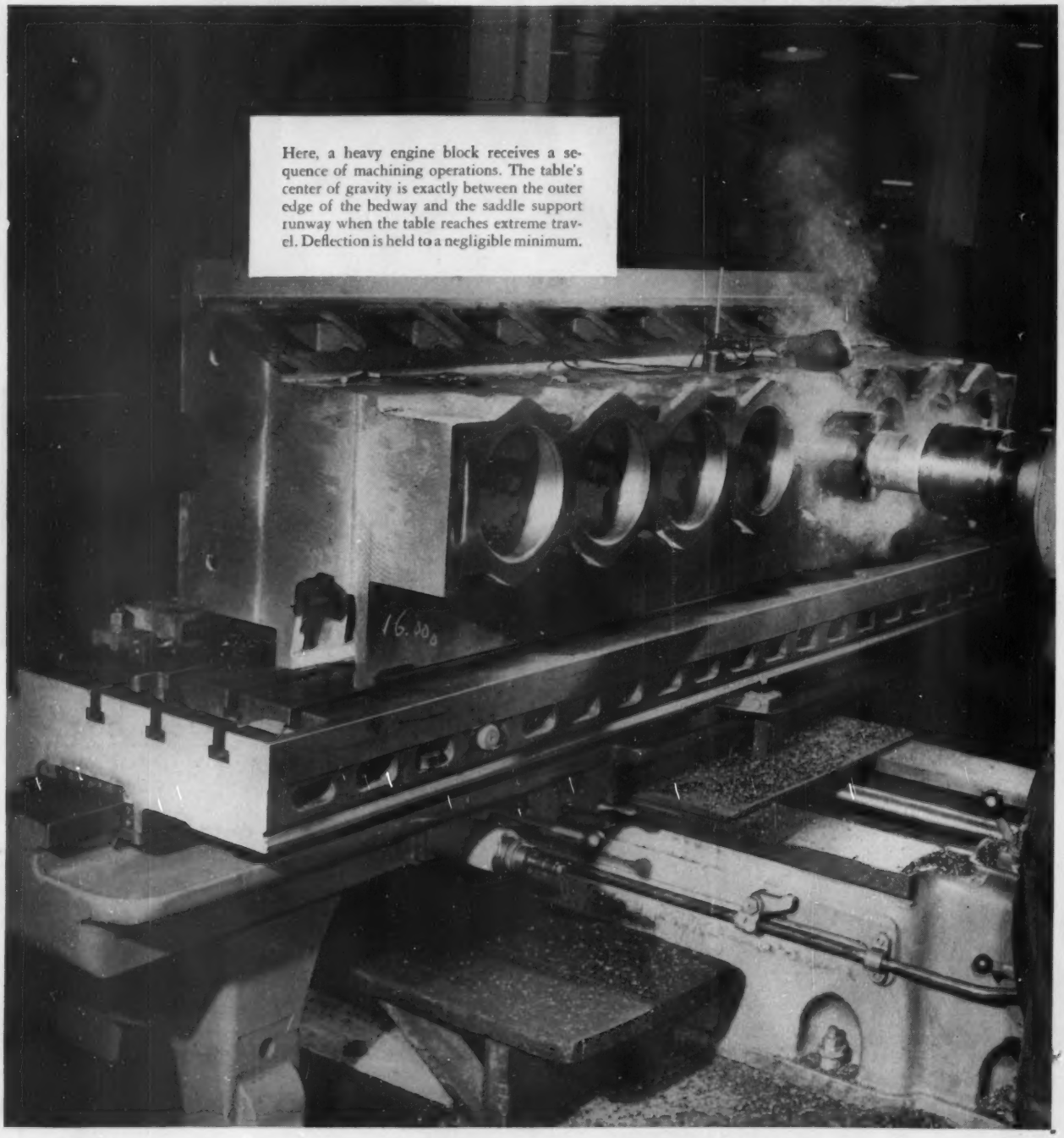


work data	
PRODUCTION	210 pieces per hour
OPERATION	grind large bearing and fan diameter
STOCK REMOVAL	.012" to .015"
TOLERANCE	.0002" on diameter

151

LANDIS TOOL COMPANY / WAYNESBORO, PENNA., U. S. A.

G&L 30 Series offers over the widest working



Here, a heavy engine block receives a sequence of machining operations. The table's center of gravity is exactly between the outer edge of the bedway and the saddle support runway when the table reaches extreme travel. Deflection is held to a negligible minimum.

you greatest precision ranges...HERE'S PROOF

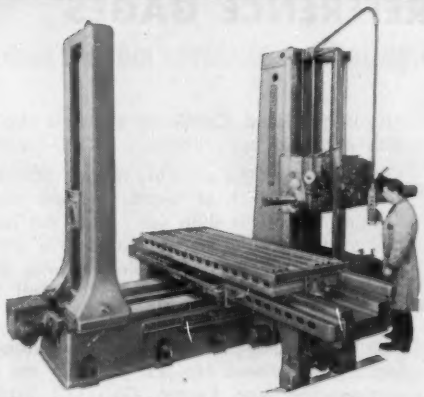
Extended saddle, saddle supports and auxiliary runways are available with G & L 30 Series Table Type Horizontal Boring, Drilling and Milling Machines. This exclusive method of supporting the table takes the risk out of precision-machining large workpieces requiring full range of the machine.

A *fully-supported,* extended saddle is absolutely vital when a long table and high columns are used to precision-machine a sequence of different surfaces on a heavy workpiece. The G&L design incorporates an extended saddle that minimizes deflection and is provided with full support even when the table is at its outermost travel limits.

What's more, G&L has engineered a system of concentric leveling (see lower right) which insures perfect alignment and parallelism between rails, saddle supports, saddle and table.

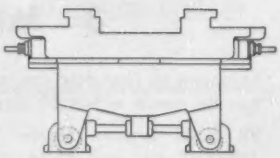
These are only a few of the many advantages you get with a modern G&L Horizontal. A selection of many other standard and optional features gives you the exact machine you need — a machine that's unsurpassed for accuracy, capacity, simplified operation and years of outstanding performance.

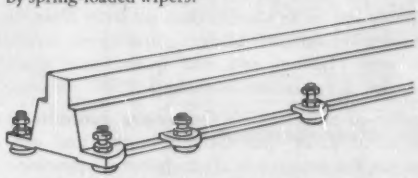
For complete details, see your G&L representative or write for catalog No. 30.



G&L 30 Series machines are available in two basic models — the 350-T (shown) with a 5" spindle and 25 hp, and the 340-T with a 4" spindle and 20 hp. Note how the under-the-floor runways allow the operator to perform his job without having to climb over the machine.

Adjustable brackets with hardened and precision-ground steel rollers. Located one to each support leg, they engage hardened and ground steel rails, are protected by spring-loaded wipers.



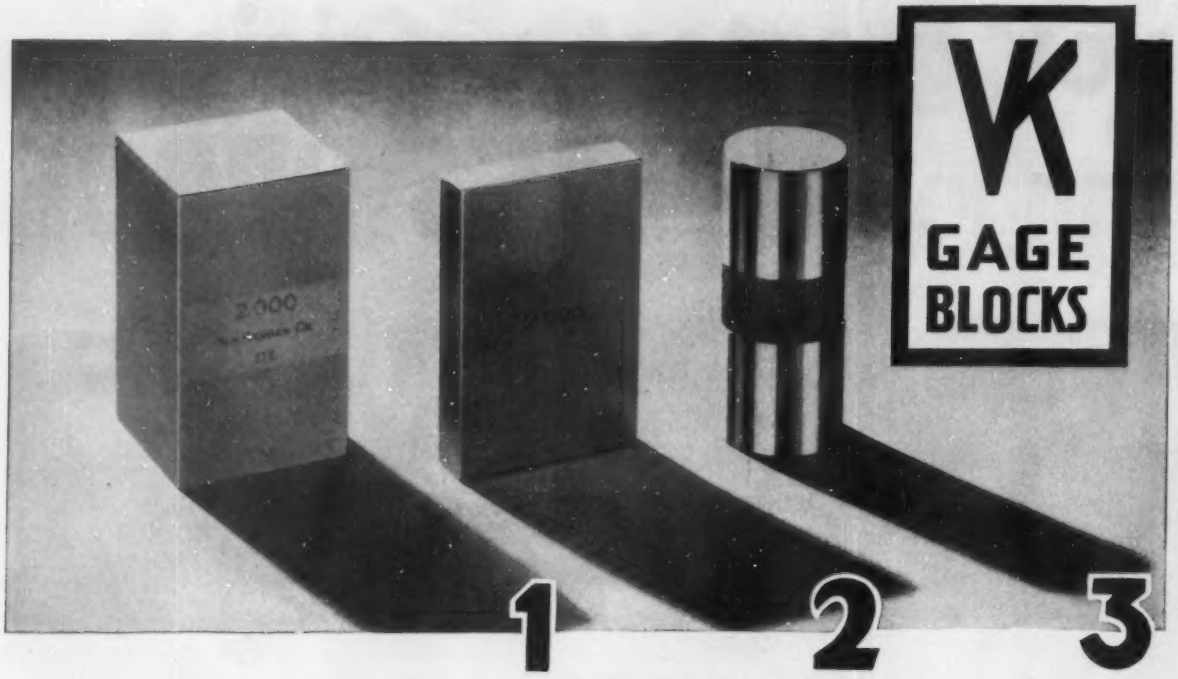


On runway, large diameter adjusting screws are threaded through flange and drilled to receive foundation bolts. Rails are sunk into foundation so tops are even with floor level. Rails and machine are separately leveled and saddle support brackets adjust independently.

Builders of the world's finest heavy-duty machine tools — Horizontal Boring, Drilling and Milling Machines — table, floor and planer types; Hypro Double Housing and Openside Planers; Planer Type Milling Machines and Vertical Boring Mills; and Davis Cutting Tools.

GIDDINGS & LEWIS MACHINE TOOL CO.

FOND DU LAC, WISCONSIN



THREE WAYS *to protect production accuracy*

To meet closest limits of accuracy and protect production, Van Keuren is currently furnishing three types of gage blocks:

1—SOLID SQUARE MASTER BLOCKS
2—RECTANGULAR REFERENCE GAGES
3—MICROGAGES

Shipment on complete sets of any of these three types can be made within 60 days from receipt of order.

VK Solid Square Master Blocks are accurate to .000004" per inch of length and are designed for laboratory use or to standardize all shop dimensions. Large wearing surface; perfect parallelism. Available in 85- and 41-block sets and guaranteed unconditionally for 5 years not to exceed .0001" in wear.

VK Rectangular Reference Gages are guaranteed accurate to .000008" per inch of length and are designed for the inspection department or precision set up work. They are available in 81-block and 33-block sets. Individual blocks from either of these sets can also be furnished. Certificate of size is also furnished with each set.

VK Microgages are accurate to plus .000012", minus .000008" per inch of length and are designed as working gages for shop use . . . to put accuracy at the machine. Wearing surface is 40% greater than that of rectangular gage blocks hence their long-wearing quality. Available in several set combinations.

Van Keuren Gage Blocks are fully described in Catalog and Handbook No, 35, yours for the asking by writing: The Van Keuren Co., 173 Waltham St., Watertown, Mass.

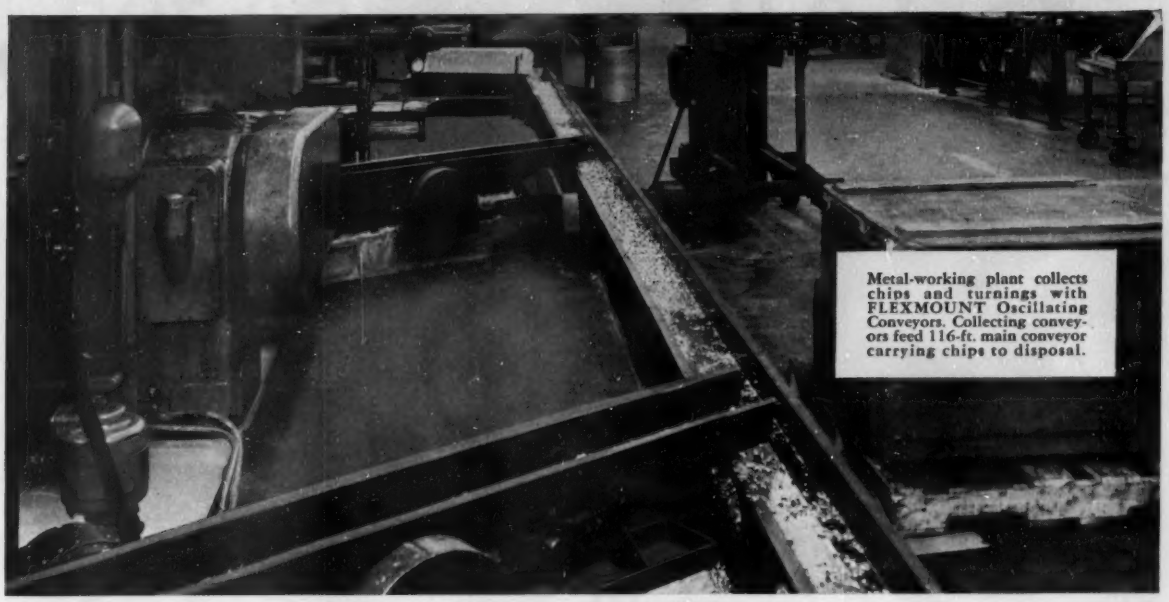
VK
35th YEAR

THE *Van Keuren* CO.,

173 WALTHAM STREET, WATERTOWN, MASS.

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Cemented Carbide Plug Gages • Carboloy Cemented Carbide Measuring Wires • Chrome Carbide Taper Insert Plug Gages

Low in cost! Highly effective!



Metal-working plant collects chips and turnings with FLEXMOUNT Oscillating Conveyors. Collecting conveyors feed 116-ft. main conveyor carrying chips to disposal.

FLEXMOUNT CONVEYORS can be installed from stock

Standardize on this versatile oscillating conveyor for your chip collection system

MASS-PRODUCED in standard lengths and standard widths, FLEXMOUNT Oscillating Conveyors cost far less than specially engineered units. They can be built up to any required length . . . from sections *carried in stock.*

FLEXMOUNTS are as easy to install as they are to order. Requiring an opening only slightly larger than the trough, they're a natural for restricted space. And the all-metal, leakproof trough has proved the low-cost answer for chips, turnings, blasting shot, punchings or stampings.

Get the complete information on FLEXMOUNT Oscillating Conveyors from your nearby Link-Belt office or distributor. He can give you a "desk-top" demonstration of FLEXMOUNT efficiency. And be sure to ask for your informative copy of Book 2478.

How Positive Action moves material

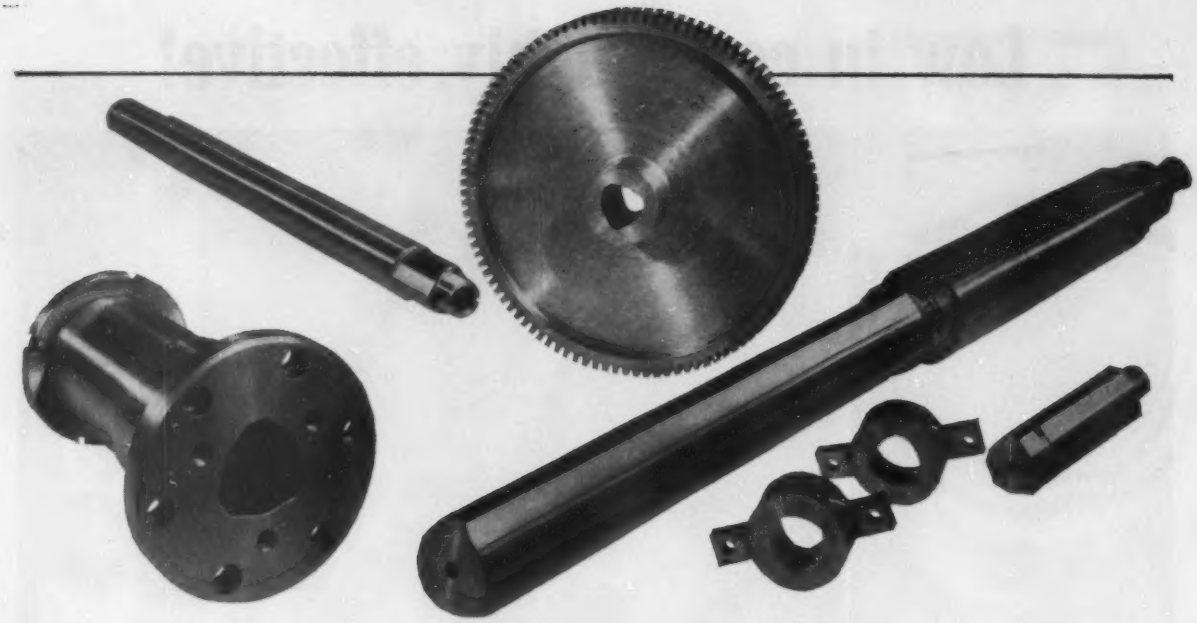
Positive-action, constant-stroke eccentric provides a powerful, yet gentle upward and forward oscillating motion. Large volumes of material are moved in a uniform, continuous flow, regardless of surges. Resonant spring action of resilient legs cuts power requirements to a minimum.

LINK-BELT

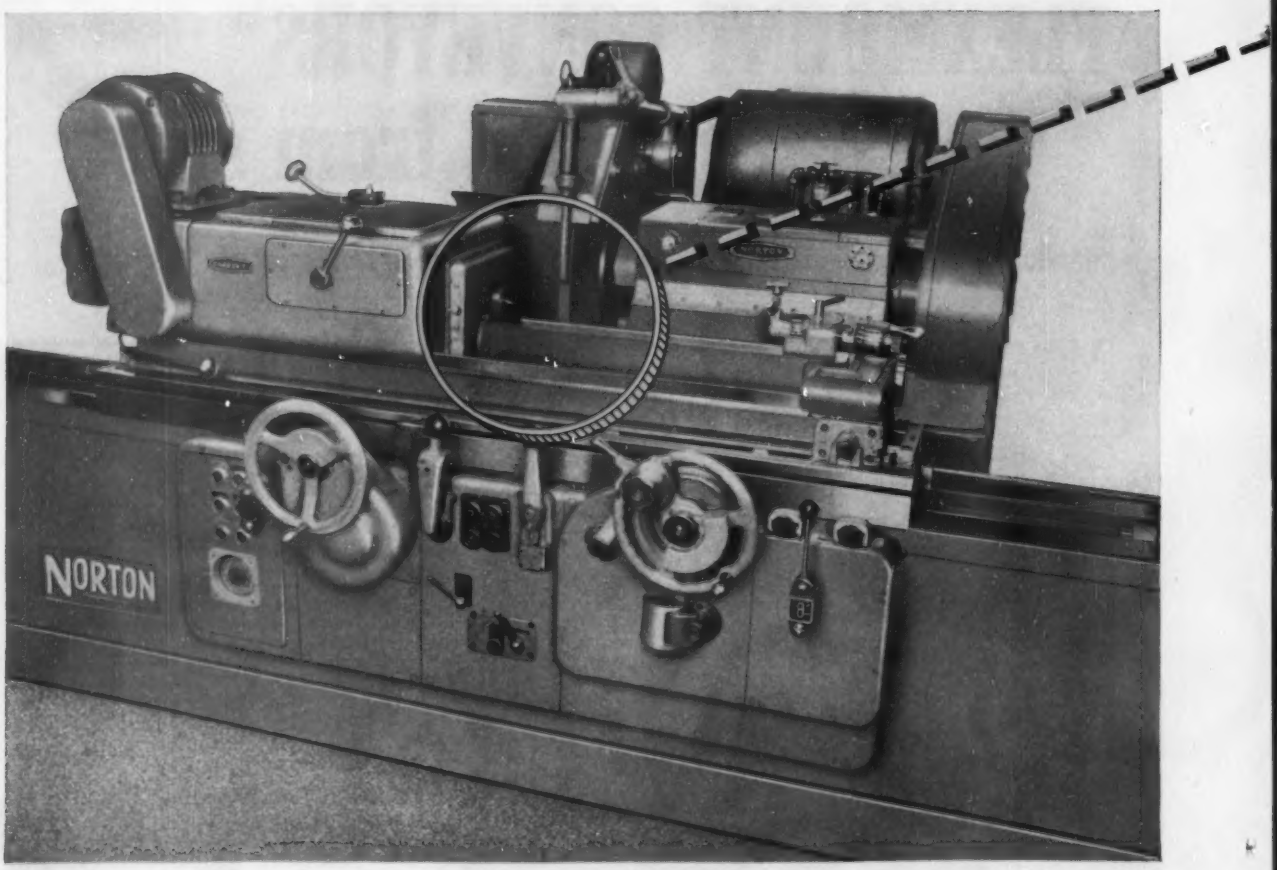
FLEXMOUNT OSCILLATING CONVEYORS

13,445

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

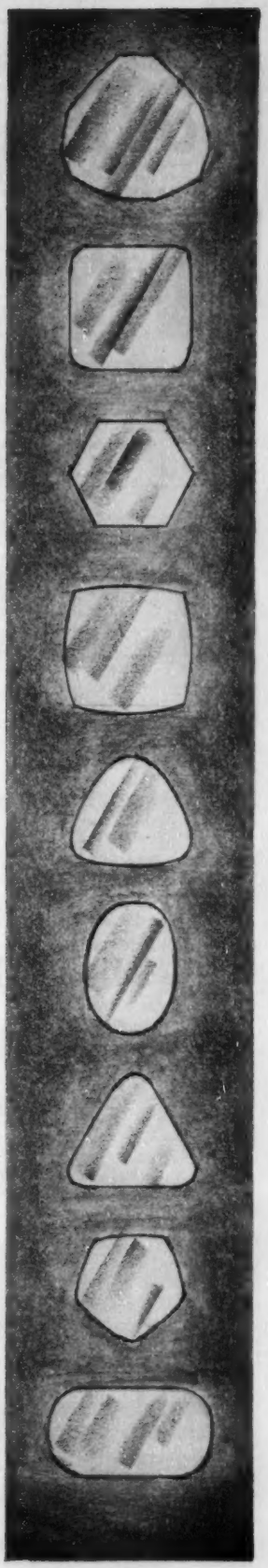


These representative types of tri-lobe shafts, shown with mating parts, are only a few of the many different shapes you can produce on Norton cam grinding equipment.



A Norton 5" x 24" Type CTU semiautomatic production Cam Grinder for maximum speed, economy and versatility.

For grinding drive shafts to any shape



here's the equipment you need

Norton cam grinding equipment produces endless variations of triangular, square, oval or many-sided forms— accurately and economically

If you are now grinding tri-lobe or other forms of drive shafts, or are planning to grind such shafts, it will pay you to investigate Norton cam grinding equipment.

Norton Cam Grinders are available in varying work capacities. They are designed for rapidly grinding shafts to the exact form you need, to the tolerance you must hold, and with the fast, trouble-free operation that means lower production costs.

Shapes you can produce are not confined to arcs, but include curves and tangent flats in combination. Broaches for producing the mating holes can also be accurately ground on this same equipment.

Call on Norton cam engineers for expert help in the design and production of shaft forms that will best meet your needs. Or send for Catalog 2053, containing further facts on cam and shape grinding equipment. And remember: only Norton offers you such long experience in both grinding wheels and machines to help you produce more at lower cost. NORTON COMPANY, Machine Division, Worcester 6, Mass. *In Canada:* J. H. Ryder Machinery Co., Ltd., Toronto 5.

To Economize, Modernize With NEW

NORTON

GRINDERS and LAPPERS

Making better products... to make other products better

District Sales Offices: Worcester • Hartford New York • Cleveland • Chicago • Detroit

Machine selection in doubt? Here's a practical way out

Kearney & Trecker's

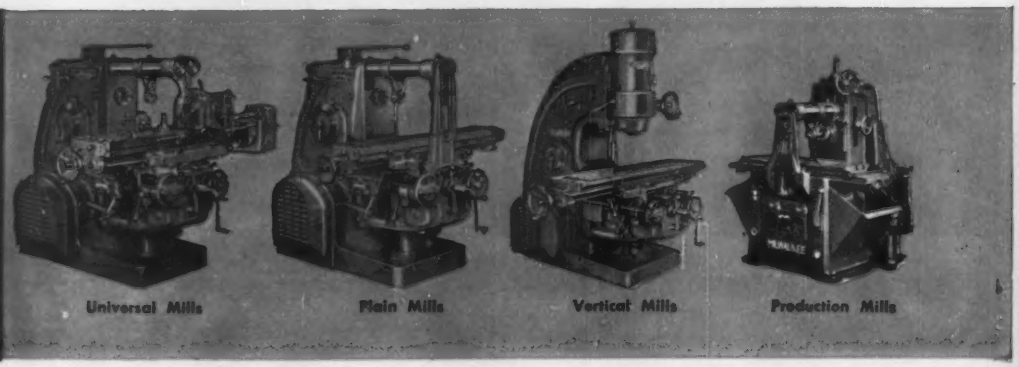
TOOL-LEASE

PROGRAM

•

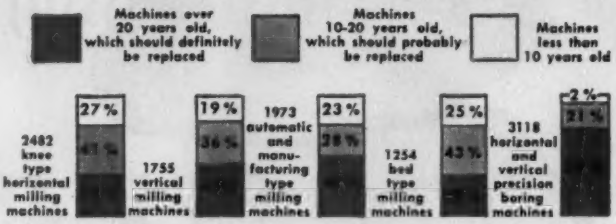
allows you to rent new machine tools...
literally try them before you buy them...
to be sure you get the flexibility you need
to meet changing competitive conditions

Kearney & Trecker manufactures a complete line of more than 250 standard knee and bed type milling machines and precision boring machines.



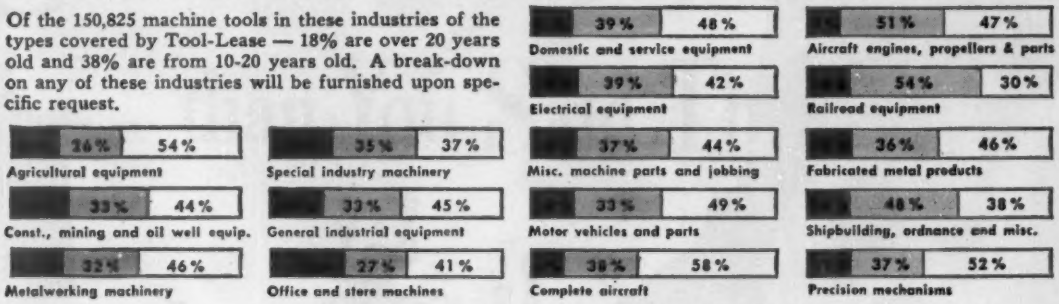
HERE'S WHAT THE OBSOLESCENCE PICTURE LOOKS LIKE IN THE MOTOR VEHICLES AND PARTS INDUSTRY

Here's the picture in a typical basic industry — MOTOR VEHICLES AND PARTS— (see chart at right). Of the 10921 standard knee type horizontal, vertical, bed and manufacturing type milling machines and precision boring machines in use today — *which could be replaced by Tool-Lease* equipment — 33% are 10-20 years old, 18% are more than 20 years old!



HERE'S THE OVERALL PICTURE IN THE ABOVE AND 15 OTHER BASIC INDUSTRIES

Of the 150,825 machine tools in these industries of the types covered by Tool-Lease — 18% are over 20 years old and 38% are from 10-20 years old. A break-down on any of these industries will be furnished upon specific request.



Figures for this presentation adapted from 1953 McGraw-Hill survey of metalworking industry.

TOOL-LEASE — A COMMON-SENSE APPROACH TO PLANT MODERNIZATION

Kearney & Trecker's Tool-Lease Program offers operating management a way to stop the trend of rising costs, increasing competition and shrinking profit margins. With Tool-Lease, you can enjoy optimum flexibility to meet changing production requirements while avoiding the risk of high obsolescence. What's more, Tool-Lease provides a way to keep your plant modern without tying up working capital.

TOOL-LEASE OFFERS A CHOICE OF PLANS TO MEET INDIVIDUAL NEEDS

Under Tool-Lease, you can rent any of the standard Kearney & Trecker *knee or bed type milling machines or precision boring machines.* All are available under three basic plans, with varying options to continue or terminate the lease or to purchase the equipment. If you require special machinery or heavy-duty CSM bed types, special agreements will be considered.

GET ALL THE FACTS NOW

For complete information on Tool-Lease . . . help in analyzing your milling and/or precision boring needs — see your Kearney & Trecker representative or mail coupon to Kearney & Trecker Corp., 6784 W. National Avenue, Milwaukee 14, Wisconsin.

TOOL LEASE
KEARNEY & TRECKER
MILWAUKEE
MACHINE TOOLS
EQUIPMENT ®

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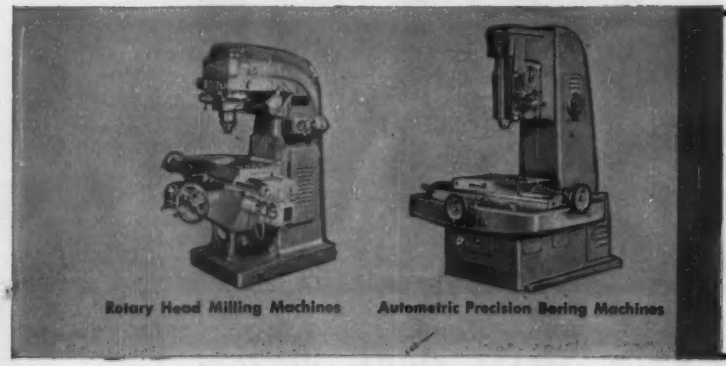


Rotary Head Milling Machines — Autometric Precision Boring Machines

Kearney & Trecker Corporation
6784 W. National Ave.
Milwaukee 14, Wis.

Please send me Bulletin TL-10A with details on the Tool-Lease Program or call Milwaukee, GReenfield 6-8300.

Name.....

Title.....

Company.....

Address.....

City..... Zone..... State.....

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER &

report from Sensation Mower, Inc.

"Even Better than You Said They Were!"

Some of the many parts for power mowers turned out by two Warner & Swasey No. 3 Universal Turret Lathes at Sensation Mower, Inc.

THIS STATEMENT came from Mr. W. H. Phelps, President of Sensation Mower, Inc., Ralston, Nebraska. His company bought two Warner & Swasey No. 3 Universal Turret Lathes in 1946 to machine parts for their power mowers.

Since that time these two versatile machines have efficiently handled all the growing metal turning requirements of the plant—more than 40 different parts for mowers, and more recently parts for their expanded line of snow removal equipment and power floor polishers. And according to Mr. Phelps they have done the job faster than our own Field Engineer said they could. The company has even been able to take on sub-contract work on the side.

This is just another example of the extreme versatility of Warner & Swasey Turret Lathes—of their ability to produce many different parts with minimum setup time. And Warner & Swaseys will provide you dependable, high precision for years after they've paid for themselves!

WARNER & SWASEY
Cleveland
PRECISION MACHINERY SINCE 1880

SWASEY MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY

Yes... Electrolizing is a COAST

Yes, from the Brooklyn Bridge to the Golden Gate, your only source for time-saving, money-saving Morse *Electrolized* Drills, Taps, Reamers, Cutters and End Mills is your nearest Morse-Franchised Distributor.

Certified test-reports prove that... on jobs where there's excessive wear, abrasion and corrosion... *Morse Electrolized Tools last 2 to 10 times longer than untreated tools.*

And that's why, on any tough job you have now... or on *any* job, tough or not, where you can profit by this extra tool life and performance... it pays to consult your Morse-Franchised Distributor on the application of Morse *Electrolized* Tools to your own particular needs. He has the practical knowledge... and he's backed by the top line and the top engineering service of the cutting tool industry.

MORSE TWIST DRILL & MACHINE COMPANY
NEW BEDFORD, MASSACHUSETTS
(Division of VAN NORMAN CO.)
Warehouses in New York, Chicago, Detroit, Houston, San Francisco

MORSE

Cutting Tools

Buy them by phone from your Morse-Franchised Distributor and save ordering time

HARDINGE-SJOGREN

HARDINGE
ELMIRA, N.Y.

SPEED

Collet Chucks with HARDINGE STEEL COLLETS

Available in Five Sizes:
1", 1⅜", 1¾", 2¼", and 3½" collet capacity.

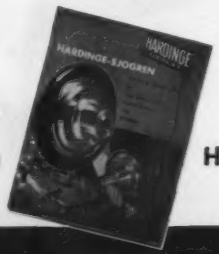
for Accuracy and Durability at Low Cost

When you order Hardinge-Sjogren Chucks and Hardinge **Steel** Collets you get all these advantages:

1. Complete Capacity for Hexagon and Square as well as Round.
2. Lowest Initial Cost.
3. Longest Service Life.
4. Grips both **short** and long lengths properly.

. . . . . and HARDINGE tempered steel collets assure you of quick release, sustained accuracy and durability.

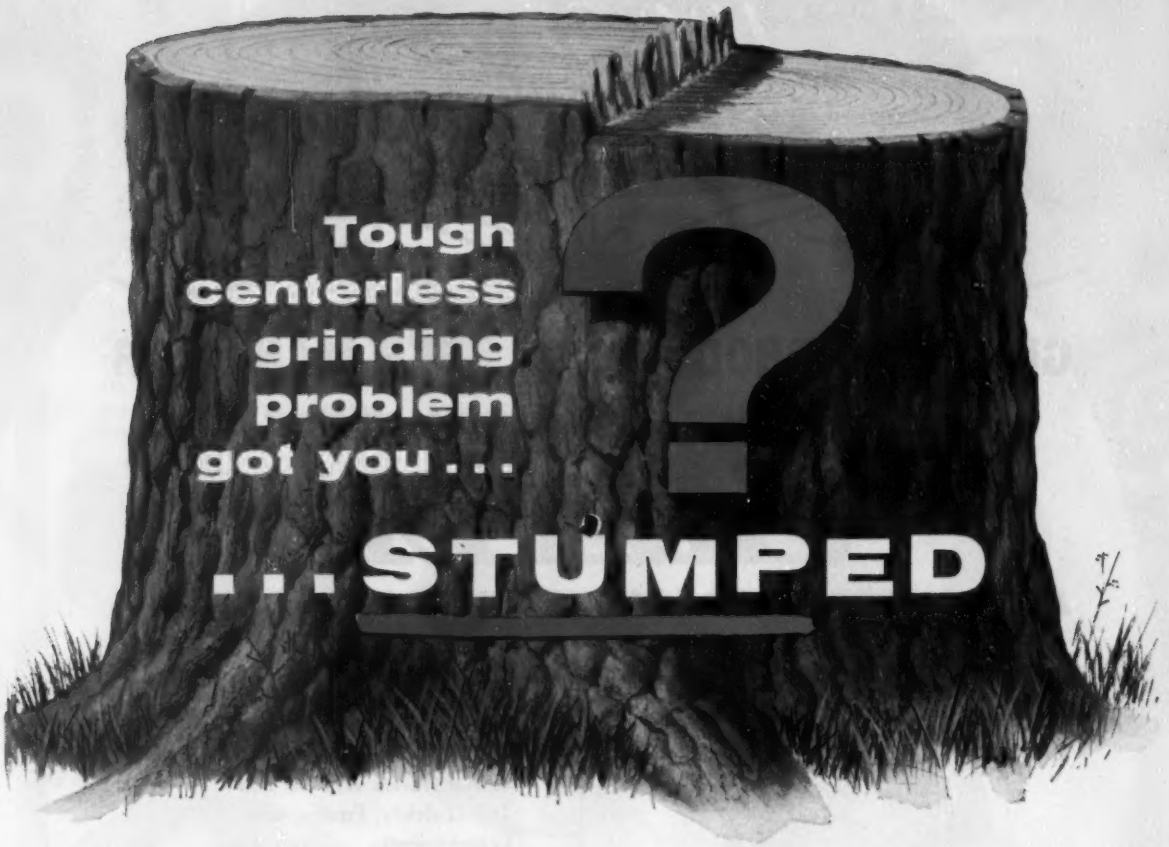
Write for Bulletin 8— complete information on



HARDINGE-SJOGREN Chucks and Collets.

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE



Here's the grinding wheel that will ABSOLUTELY solve it!

CINCINNATI Grinding Wheels can help you solve that tough centerless grinding problem . . . because CINCINNATI Wheels are made to team-up with centerless grinders. And with a Cincinnati Milling-trained machinist on the spot to help you get to the root of the problem, you can count on the *right answer*–FAST! Here's why:

1 We've solved hundreds of centerless grinding problems involving high stock removal, good finish, accurate sizing, and high production per dressing, by using the right CINCINNATI Wheels.

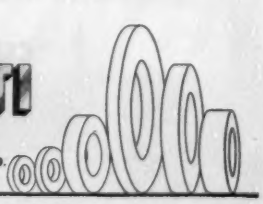
2 CINCINNATI Grinding Wheels were developed by Cincinnati Milling, which, in the field of centerless grinders, has done more research, had more experience and made more machines than any other organization in the world.

3 CINCINNATI Grinding Wheels are based on an entirely new approach to grinding wheels, the development of the grinding wheel as a true cutting tool, and they represent twenty-five years of Cincinnati Milling research and practical experience.

We are so confident–*so absolutely sure*–that CINCINNATI Grinding Wheels can help you that we make this *unconditional* offer: Either you must be completely satisfied, or we will issue full credit for the CINCINNATI Grinding Wheel used.

So contact us at once. We'll send one of our Cincinnati Milling-trained machinists to show you how to get the most out of CINCINNATI Grinding Wheels. There is no charge for his service. Write, wire or phone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

CINCINNATI
Grinding Wheels
THE CINCINNATI MILLING MACHINE CO.
Cincinnati 9, Ohio



1854 *100 Years* 1954

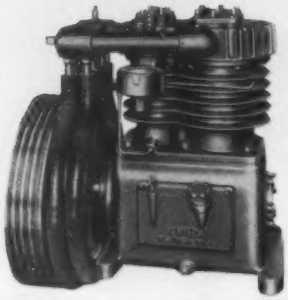
OF SUCCESSFUL MANUFACTURING EXPERIENCE

GET MORE PRODUCTION...PER MAN-HOUR

with the help of dependable, efficient

Curtis

AIR COMPRESSORS • AIR CYLINDERS • AIR HOISTS



MORE AIR AT LESS COST...
with powerful, precision-built *Curtis* compressors

- available up to 50 H.P.
- improved — two-stage design delivers more air per horsepower
- air-cooled — no freeze up — low-cost installation and operation
- Timken tapered main bearings permit external adjustment
- pressure lubricated rod and piston bearings for long life

Tank mounted compressors
¼ through 15 horsepower
Simple compressors
¼ through 50 horsepower

TO LIFT, LOWER, PUSH, OR PULL *Curtis* Air Cylinders or Air Hoists Will Do The Job Quickly, Easily, and Economically — capacities up to 10 tons.

- low-cost trouble-free operation
- smooth and delicate control
- cylinders, ground and polished
- disc-type valves lapped to seat

Pendant Air Hoist...
ideal for any lifting or lowering application.

Bracketed Air Cylinder
can be mounted horizontally or vertically for lifting, lowering, pushing, or pulling.

FOR COMPLETE INFORMATION on how Curtis equipment can make your production more profitable, write today...

CURTIS PNEUMATIC MACHINERY DIVISION
of Curtis Manufacturing Company
1924 Kienlen Avenue, St. Louis 20, Missouri

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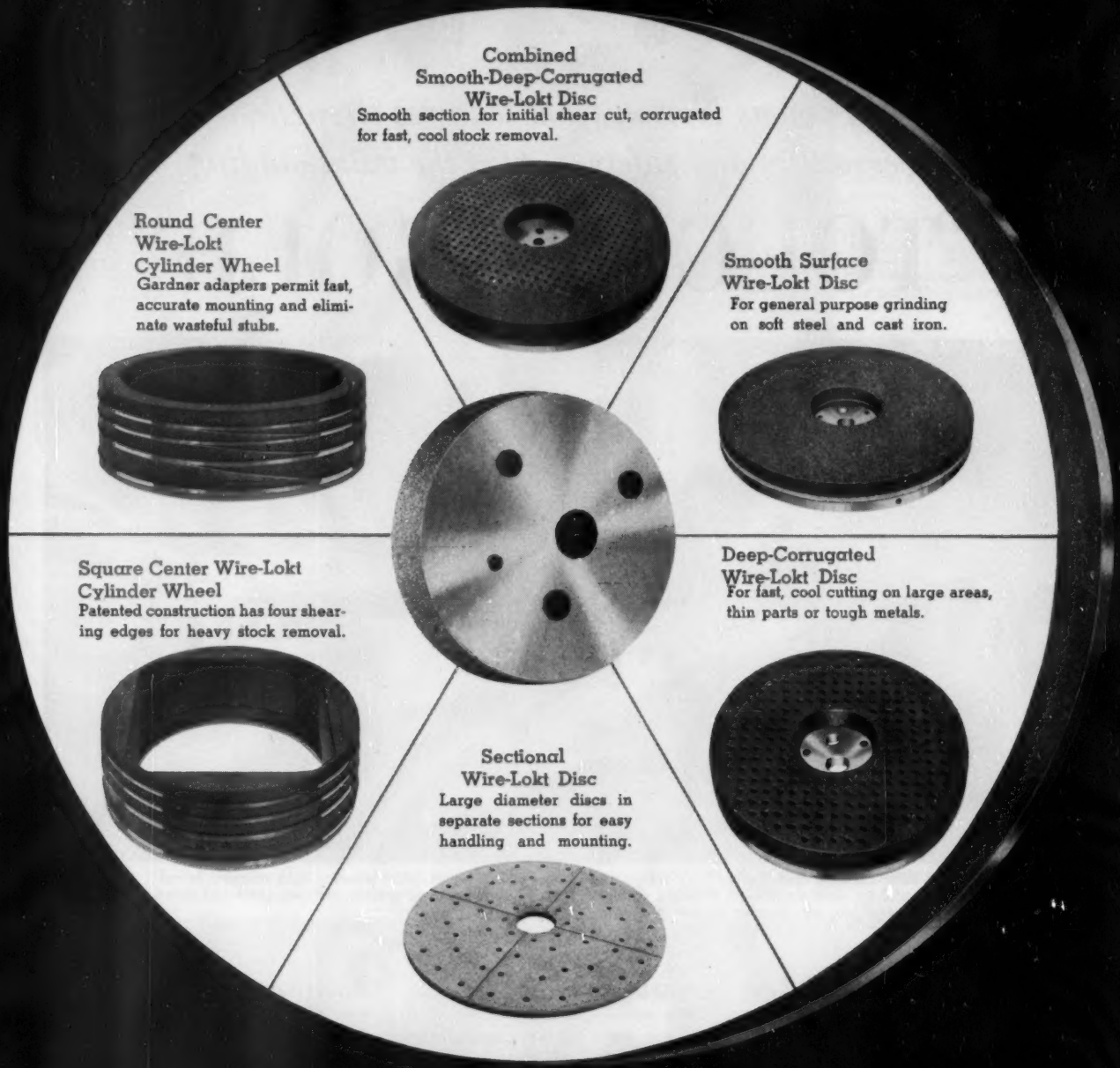
6 Cost Cutting Abrasive Ideas to Cut Your Grinding Costs


Combined
Smooth-Deep-Corrugated
Wire-Lokt Disc
Smooth section for initial shear cut, corrugated for fast, cool stock removal.
Round Center
Wire-Lokt
Cylinder Wheel
Gardner adapters permit fast, accurate mounting and eliminate wasteful stubs.
Smooth Surface
Wire-Lokt Disc
For general purpose grinding on soft steel and cast iron.
Square Center Wire-Lokt
Cylinder Wheel
Patented construction has four shearing edges for heavy stock removal.
Deep-Corrugated
Wire-Lokt Disc
For fast, cool cutting on large areas, thin parts or tough metals.
Sectional
Wire-Lokt Disc
Large diameter discs in separate sections for easy handling and mounting.

118A

- Wire-Lokt Safety Construction
- Tailored to Your Grinding Needs
- Bonds for Wet or Dry Grinding
- For All Standard Types of Mounting
- Nation-wide Abrasive Engineering Service

Your local Gardner Abrasive Man is ready to help you. Write and we will have him call at your plant.

GARDNER MACHINE COMPANY
410 Gardner Street • Beloit, Wisconsin

GARDNER
abrasive discs

Meet the BIG 4 in Reinforced Wheels

BFR BD BN BF

Famous Norton team features strength, versatility and safety . . . plus the value-adding

"TOUCH of GOLD"

BFR Semi-Flexible Hub-Type. Cotton fabric and Nylon reinforcement. Most popular light snagging wheel Also useful for weld smoothing, blending contours, light finishing, removing scale, notching gates and risers, minor cut-off jobs, etc. Reaches hard-to-get-at places.

Here's a Norton wheel family that's closely related in a number of ways that add up to better grinding jobs for *you*. Each has strong, laminated construction that provides much more than the usual margin of safety. Each is designed to cover a wide range of everyday grinding jobs. And each is engineered to give you fast, trouble-free, economical grinding — the true "Touch of Gold" — every time you put it to work.

The "Big 4" make up a well-balanced team, consisting of two sturdy hub-type wheels (BD rigid and BFR semi-flexible); one straight wheel (BF semi-flexible); and one cut-off wheel (BN). All are resinoid bonded.

The accompanying action shots can only hint at the "Big 4's" practically unlimited usefulness. Why not find out just how much time and money they can save you in your own grinding applications?

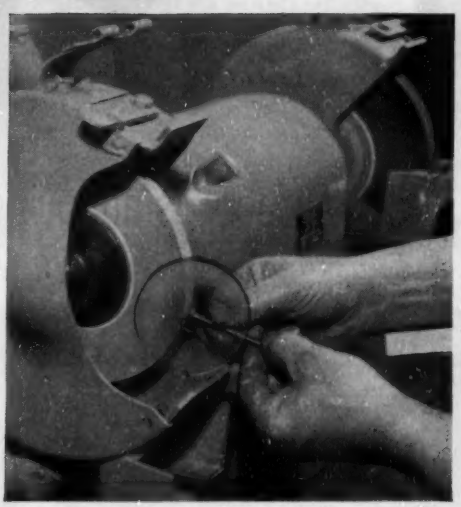
Ask Your Norton Distributor

to demonstrate Norton Reinforced Wheels in your shop. He knows the types and sizes of wheels you need, will be glad to help you in any grinding problems, and will call in a Norton Abrasive Engineer, if necessary. Or write to NORTON COMPANY, Worcester 6, Mass. for the Brand New Catalog on Reinforced Wheels. Distributors in all principal cities, listed under "Grinding Wheels" in your classified phone directory. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Massachusetts. W-1547

NORTON
ABRASIVES
Making better products . . . to make other products better

BD Rigid Hub-Type. Glass cloth and Nylon reinforcement. For heavier stock removal, smoothing flame-cut edges, slotting, notching, cutting-off and many other jobs where finish is less essential. Bridges the gap between the BFR wheel and the conventional cup wheel for portable grinding.

BN Cut-Off. Glass cloth reinforcement. One of the safest, longest-lasting cut-off wheels in industry. For cutting-off gates and risers from non-ferrous castings, cutting wire rope, cutting many non-metallic materials, notching, slotting railway track welds, etc.

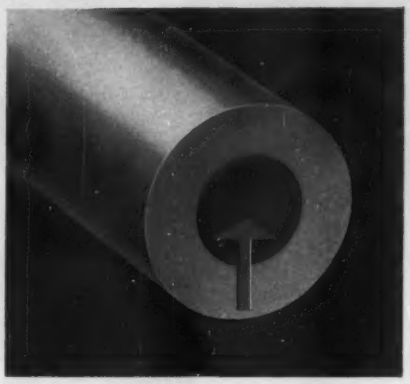


BF Semi-Flexible. A straight wheel with cotton fabric construction. Ideal for deburring jobs, including stampings too large for tumbling. Also for blending and smoothing light welds and curved surfaces, removing flash from plastics, etc. For grinding on periphery only.

BF Mounted Wheels and Points. Same laminated construction as BF wheels. Like all Norton mounted wheels and points they're trued on their own spindles. Available in a wide variety of sizes and shapes for polishing die cavities, chamfering, Brinnell spotting, etc.

BF Hand Sticks. Laminated construction, as in BF wheels and mounted wheels and points. These convenient sticks provide an easy method of final hand polishing in places where wheels and buffing devices can't reach.

a hole here is annoying . . .



a hole here is helpful

Crucible Hollow Tool Steel Bars are helping eliminate the wasteful practice of drilling out a solid bar to make ring-shaped, or tubular steel parts, or tools with a center hole. The hole is already in Crucible hollow tool steel bars . . . no need for drilling, boring, cutting-off or rough-facing operations.

You can get these hollow bars in any of Crucible's famous tool steel grades, in almost any combination of O.D. and I.D. sizes. And you can get *immediate* delivery of five popular grades—KETOS® oil-hardening, SANDERSON® water-hardening, AIRDI 150® high carbon-high chromium, AIRKOOL® air-hardening, and NU DIE V® work tool steels—from a conveniently located Crucible branch warehouse.

Call your Crucible representative for the full story of how these steels can best save you time and money. You'll be glad you did.

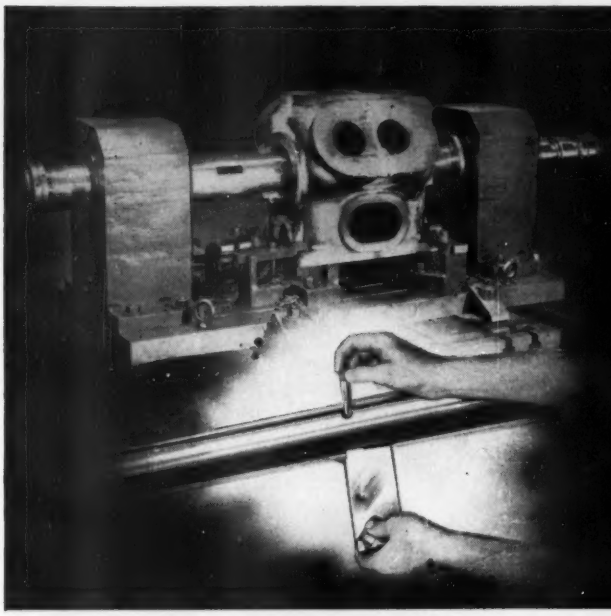
CRUCIBLE first name in special purpose steels

54 years of Fine steelmaking

HOLLOW TOOL STEEL

CRUCIBLE STEEL COMPANY OF AMERICA • TOOL STEEL SALES • SYRACUSE, N. Y.

ROUTINE BORING: If there's a better way to do it, DAVIS will know it!

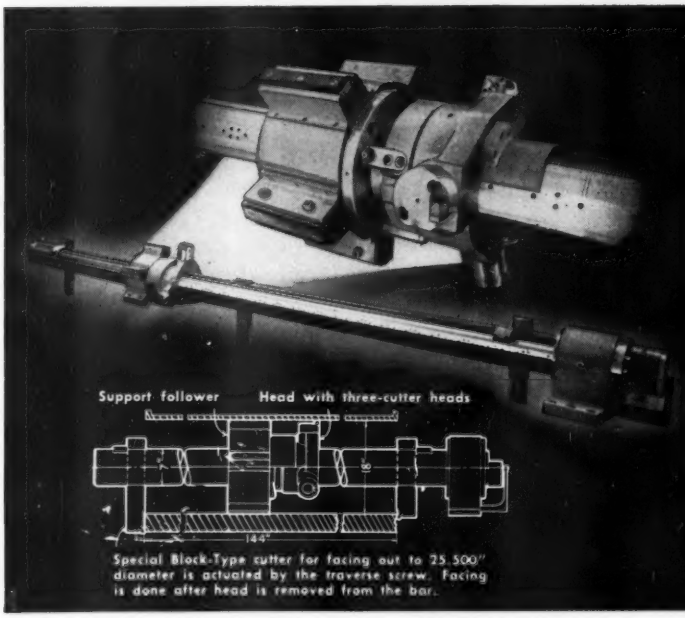


Here's how Davis tools help improve everyday jobs

Davis Block-Type cutters simplify ordinary float boring and reaming. Here, you see Davis Block-Type cutter, mounted in a Davis line bar, being used to bore the crank bores in an air conditioning housing.

Davis Block-Type cutters are exceptionally easy to insert or remove from the bar. Mere insertion or removal of the pin does the job. Without changing bar or setup, cutters can be changed for a sequence of operations.

EXTRAORDINARY BORING: If DAVIS can't bore it, it can't be done!



Special Block-Type cutter for facing out to 25.500" diameter is actuated by the traverse screw. Facing is done after head is removed from the bar.

Traveling and feedout boring heads and blocks

Here's a special Davis three-cutter traveling boring head used to bore, face and chamfer. Mounted on a bar in a lathe, it is fed through the work by means of a traverse screw connected to the head. The support follower head, which assures a straight bored hole, slides through the bore while the bar rotates on needle bearings. Cross slide blocks face the two ends of the workpiece . . . are also used to cut phonographic grooves at the end.

The lathe spindle drives the bar, and work is supported in a special fixture. Gear box provides feed and rapid traverse in inches per revolution. Feed rates can be varied by changing gears.

What's your boring problem?

Davis makes a complete line of interchangeable block-type cutters, boring heads, boring bars, super-micrometer fly-cutter tools, L-type micrometer boring tools, special boring tools and accessories. Offers you a complete tooling service to solve any routine or extraordinary boring problems. Get the facts now. Write for the new Davis Catalog 304.

DAVIS
BORING TOOL DIVISION
OF GIDDINGS & LEWIS MACHINE TOOL CO.
FOND DU LAC, WISCONSIN

Oil Shale Demonstration Plant, Rife, Colorado

Shostal Press Agency Photo

BULLARD

The Invisible Background of Industrial Progress

In 1850 the bulk of work was done by men and draft animals. Only a little more than six per cent of all the energy used in the United States was used by machines. Lacking good lubricants, the machines available were subject to frequent breakdowns. The discovery of oil in 1859 made possible the development of high-speed steam-driven engines and internal combustion engines. As a result, our use of mechanical energy has multiplied 250 fold in nine and a half decades, and now does 90 per cent of the work in this country.

Modern plants, which produce this vital oil, require equipment which is manufactured with *Modern Machine Tools* — another illustration of "The Invisible Background of Industrial Progress."

THE BULLARD COMPANY · BRIDGEPORT 2, CONNECTICUT

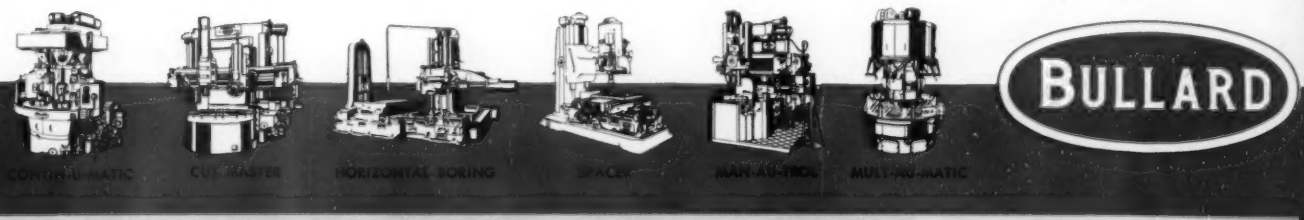
Bullard Spacer

Available in two sizes,
30" x 20" and 4" x 4"

The experience of the Lockheed Aircraft Corporation, Burbank, California, shows the following manufacturing advantages offered by the Bullard Spacer in fabricating a cast aluminum support for the P2 V5 Neptune Anti-Submarine Aircraft.

Automatic spacing
Reduction of set-up time
Greater accuracy — fewer rejects
Elimination of jigs and related costs
Simplified tooling — lower maintenance costs

These factors can be applied to your manufacturing process where accurate and precise drilling, reaming or tapping to exacting standards is required. A Bullard Representative will gladly give you the complete Bullard Spacer story — call him, or write to The Bullard Company, Bridgeport 2, Connecticut — phone 6-2511.



ARMSTRONG

The ARMSTRONG Threading Tool takes interchangeable high speed steel form-cutters which require only flat top grinding to resharpen—always hold their true thread form.

Write for catalog

Each year ARMSTRONG TOOL HOLDERS become more important to you

Every rise in labor costs, every added tax, every overhead burden, every increase in cutting steel prices, every new, more costly machine tool, all increase the importance of ARMSTRONG TOOL HOLDERS to profitable operation.

ARMSTRONG TOOL HOLDERS reduce direct tooling costs to an absolute minimum—"Save: All Forging, 70% Grinding, 90% High Speed Steel."

ARMSTRONG TOOL HOLDERS reduce tooling-up time to minutes, to the selection and adjustment of the holder and cutter.

ARMSTRONG TOOL HOLDERS permit increased speeds and feeds—produce more pieces per hour per machine tool.

ARMSTRONG TOOL HOLDERS are efficient for they embody a perfection gained by over 50 years of specialization in the development and refinement of tool holders.

ARMSTRONG TOOL HOLDERS are inexpensive because they are quantity produced by modern methods, for a world market . . . are used by over 96% of the machine shops and tool rooms . . . are carried in stock for your convenience by all industrial distributors of consequence.

Buy **ARMSTRONG TOOLS** from your Industrial Distributor

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

5215 W. ARMSTRONG AVENUE CHICAGO 30, ILL.

More dollars profit for you when you use SPEED-WET® METALITE® Fibre Discs

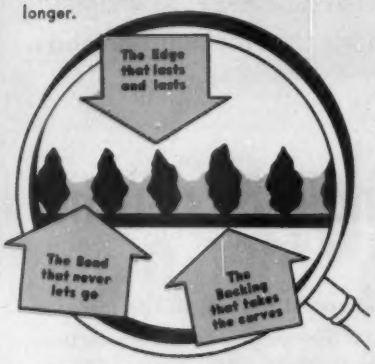
For the reasons given at the left, SPEED-WET METALITE Fibre Discs are the fastest-cutting, longest-lasting Discs you can get. The time they save on every job and the extra grinding mileage you get from every disc, increase your profit margin by the amount they cut your grinding costs.

Until you actually use SPEED-WET METALITE Fibre Discs you just can't appreciate how much faster and cleaner you can grind with these sharp-cutting discs. The quick way to find out is a FREE trial right in your own plant. Just write and let us know when and where. Address Behr-Manning, Troy, N. Y., Dept. AM-6.

In Canada: Behr-Manning (Canada) Ltd., Brantford.
For Export: Norton Behr-Manning Overseas Inc., New Rochelle, N. Y., U. S. A.

THE HARD COLD FACTS

Here are the 3 main reasons why SPEED-WET METALITE Discs cut cleaner, faster, longer.



1. THE ABRASIVE is harder and sharper. It's Aluminum Oxide — a real NORTON grinding wheel grit, almost diamond-hard that holds its cutting edge far longer than ordinary grits.

2. THE BOND is immune to heat. It's a Thermo-setting, non-softening resin bond, made doubly strong by the exclusive BEHR-MANNING® DURABONDED® process that anchors the grains securely.

3. THE BACKING is all-fibre that combines enough flexibility to grind curves with enough stiffness to assure plenty of cutting action.

GET THESE HELPFUL POINTERS ON DISC GRINDING

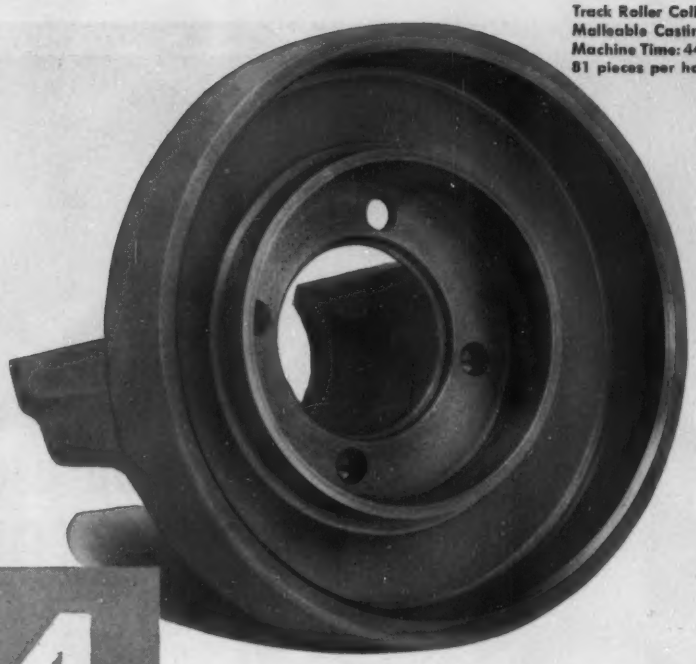
This folder points out the common faults in disc grinding and tells how to use a disc grinder correctly to avoid them. A copy will be mailed to you on request. Ask for the December 1953 *Barneygram*.

G-2

BEHR-MANNING CORPORATION
division of NORTON Company

▲ COATED ABRASIVES
▲ SHARPENING STONES
▲ PRESSURE-SENSITIVE TAPES

For the newest in coated abrasives..watch BEHR MANNING!



Track Roller Collar
Malleable Casting
Machine Time: 44 Seconds—
81 pieces per hour.

17 operations in 44 seconds

...that's 81 pieces per hour, or 4 TIMES FASTER than by the former method...

on an ACME-GRIDLEY 8-spindle 8" chucker

Speaking of "plant automation"—how better can the modern practice of it begin than on machining methods that complete ALL the operations on intricate parts in a single predetermined cycle, in a cycle time that avoids toting the job from one machine to the next, eliminates costly manhours, investment in secondary operation machines, releases valuable floor space?

On the job shown, or any other which is "automized" through multiple spindle planning, ingenious and sound tooling of the machine to include ALL the operations in the least time becomes a matter of vital importance.

This is where the unparalleled experience of our tool Engineers wins and holds preference for Acme-Gridley bar and chucking automatics—in hundreds of shops.

Whether your chucking work calls for 4, 6 or 8 spindles, whether 4 or 20 different operations, it will pay you to look at our proposal.

REMEMBER: *No industry can do* **TODAY'S** *job—with* **YESTERDAY'S** *tools—and make a profit* **TOMORROW.**

The NATIONAL ACME COMPANY

170 EAST 131st STREET • CLEVELAND 8, OHIO

ACME-GRIDLEY BAR and CHUCKING AUTOMATICS
1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • Limit, Motor Starter and Control Station Switches • Solenoids • Contract Manufacturing

QUALITY CONTROL CHECK AT FACTORY. READING OF "ONE-TENTH" INDICATOR READS O ALONG 6" OF THE PARALLEL. NOTE ADJUSTABLE STOP (*See Inset*).

New J & S Precision Grinding Vise square within 0.0001" or less in 1" in 4 positions

Hardened, Ground and Lapped — Deep Frozen for Stabilization — Holds Tapered Diameters and Odd-shaped Workpieces

For inspection, grinding, milling, drilling and tapping, jig boring, layout work . . .

This new J & S "Square-perFect" Vise is one of the most practical precision vises ever developed. Its many helpful features explain why:

It is square, for example, with 0.0001" or less in 1" in 4 positions. It is attachable to J & S 5" sine bar with 0.100" recess for small angles.

Accurate, Adjustable Stop

Like all J & S workholding tools, it has a unique downholding clamping action. This assures dependable, accurate positioning of workpieces. An adjustable stop provides fast, *sure* positions for repeat operations. Workpieces can be loaded and unloaded rapidly.

Holds Tapered, Odd-shaped Workpieces

The clamping jaw of this J & S Precision Grinding Vise swivels to permit holding of tapered and odd-shaped workpieces. It holds round stock from 1/16" to 2½" in diameter in Vee-block fashion. The range of jaw openings is from 0" to 3".

Get all the facts without delay. Fill-in the coupon and mail it today.

J & S TOOL CO., INC.,
W. Mt. Pleasant Avenue, Livingston, N. J.

Please send me complete information on your J & S Precision Grinding Vise.

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STREET.....

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J&S TOOL CO., INC.

WHEEL DRESSERS • JAW CLAMPS • PRECISION VISES • SINE BARS • DOWN-HOLDING DEVICES

646 W. Mt. Pleasant Ave., Livingston, New Jersey

NEW NATCO HOLESTEEL

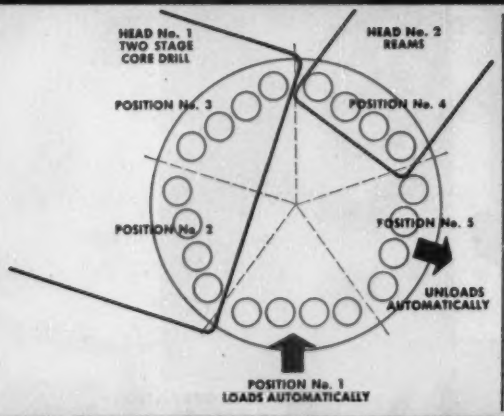
. . . THIS IS ANOTHER MACHINE

NATCO ENGINEERED
for quality and quantity production

CUTS TRACK LINK BUSHING COSTS!

AUTOMATICALLY CORE DRILLS and REAMS SIX DIFFERENT SIZES UP TO...

400 PARTS per HOUR!



FIVE POSITION INDEXING TABLE WITH 20 CHUCKS, AUTOMATIC LOAD and UNLOAD

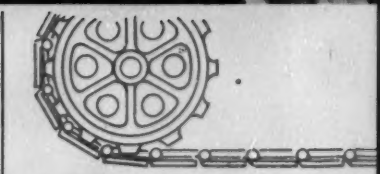
POSITION No. 1
Automatically loads four bushings . . .

POSITION No. 2
Core drills halfway through . . .

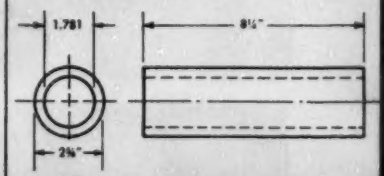
POSITION No. 3
Core drills through . . .

POSITION No. 4
Reams through to size . . .

POSITION No. 5
Automatically unloads four bushings.



TRACK LINK BUSHING



This new NATCO HOLESTEEL automatic indexing machine core drills and reams six different size bushings ranging from 5" to 8¼" in length, 2⅛" to 2⅝" O.D. and 1.4375" to 1.781" I.D. at the rate of from 270 to 400 per hour estimated gross production. The production depends upon the size bushing being run. Estimated gross production is based on 85% of maximum capacity. The stock from which these parts are made is seamless steel tubing and approximately 1/16" of stock is removed in this core drilling and reaming operation.

Call a Natco Field Engineer

to help you solve your problems in Drilling, Boring, Facing and Tapping.

NATCO

NATIONAL AUTOMATIC TOOL COMPANY, INC., Richmond, Indiana

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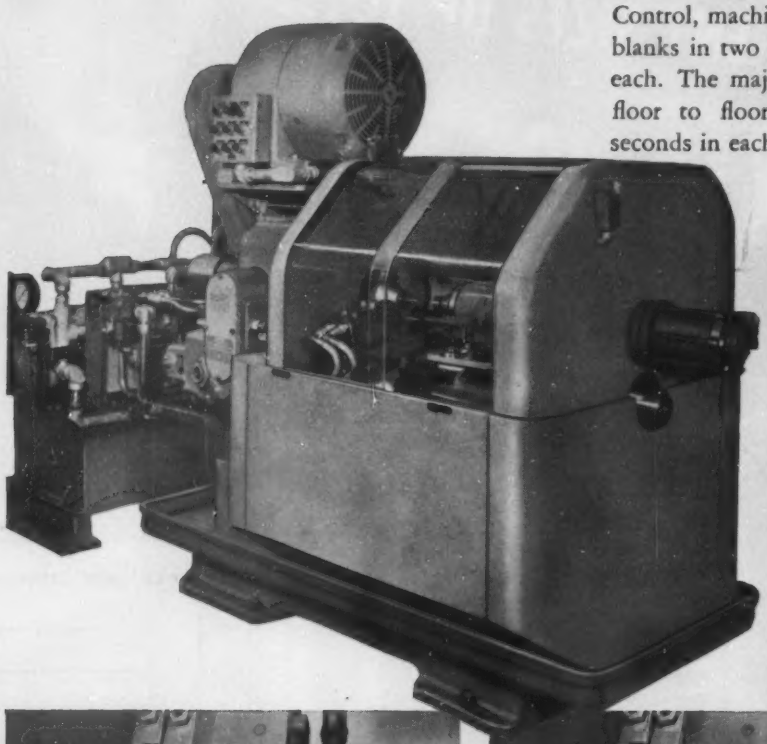
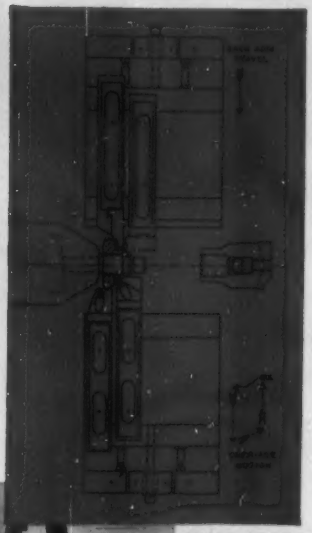
Fay Automatics combine **AUTOMATICITY** and **HIGH VELOCITY TURNING**

with results like this —

SIDE GEARS

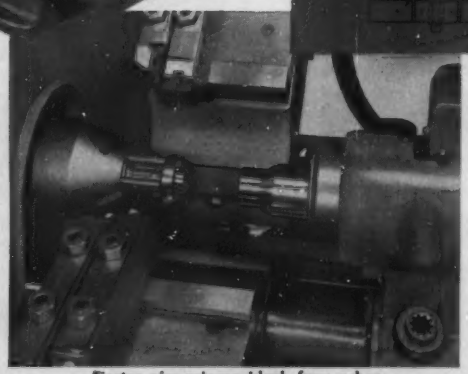
Two 8″ Fays, with Automatic Sequential Control, machine all exterior surfaces of the blanks in two operations; one machine for each. The major diameter is 2-15/16″ and floor to floor time is approximately 18 seconds in each operation.





FIRST OPERATION: Note intricate movements of the carriage, which turns the hub, back angle and major diameter. The back arm faces and forms.

Tailstock presses blank on arbor



Ejector pins release blank from arbor

Production management regularly relies upon the engineering services of Jones & Lamson for the latest information on methods, costs, tooling and performance. Why not consult us about YOUR *turning, threading and inspection problems?*

JONES & LAMSON

Machine Tool Craftsmen Since 1835

JONES & LAMSON MACHINE CO., 502 Clinton St., Dept. 710, Springfield, Vt., U.S.A.

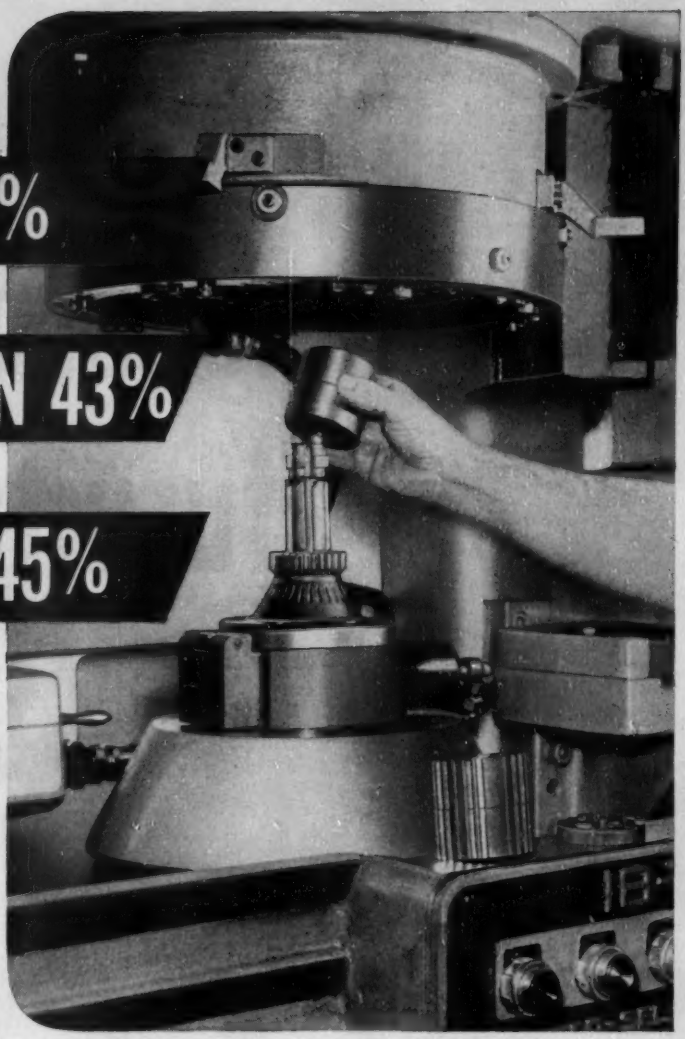
J&L MACHINE TOOL DIV.

TOOL LIFE UP 75%

DOWN-TIME DOWN 43%

PRODUCTION UP 45%

USING SHEAR-SPEED SOLUBLE OIL



on multiple "single-point" form cutting operation in the plant of a large auto manufacturer. IMPARTIAL PRODUCTION TESTS of previous "best" cutting fluid vs. SHEAR-SPEED Soluble Oil were run under *exactly* similar conditions—same machine, same parts, same tool grinding, same coolant flow.

JOB SPECS: 24-tooth transmission gears, 2.5" pitch dia., 1.185" face width, cut two at a time on gear shaper from SAE bar steel, 207-228 BHN.

ACTUAL TEST DATA (averaged)

■ Previous Best Cutting Fluid

■ SHEAR-SPEED Soluble Oil

OVERALL TOOL LIFE	15,200 parts / 26,600 parts	75% improvement
DOWN-TIME PER PART	.0625 min. / .0357 min.	43% improvement
PARTS PER HR. (INC. DOWN-TIME, ETC.)	86 / 125	45% improvement
CYCLE TIME* (FLOOR-TO-FLOOR)	55 sec. / 35 sec.	36% improvement

*Tool life increased despite higher cutting speed.

A few select sales areas still available.

Convince yourself of the amazing advantages and versatility of SHEAR-SPEED Soluble Oil in your own plant. Sold only on a satisfaction guaranteed test basis. Write for Bulletin SO-53 and price list.

SHEAR-SPEED CHEMICAL PRODUCTS

7125 E. McNICHOLS RD. *A Division of Michigan Tool Co.* DETROIT 12, MICH.

modern machines MAKE modern furniture...

Photos courtesy The Troy Sunshade Company, Troy, Ohio

In this modern furniture factory, modern Cincinnati Shears give an accurate, economical and versatile performance. Ease of operation, rapid, simple gauging, holding work securely and clean cutting, all speed production and reduce costs.

Write for Cincinnati Shear Catalog S-6.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

CINCINNATI

"Maintenance costs small, operators like LeBlonds..."

machine tool builder Greaves

Lineup of LeBlond Lathes at Greaves: 17" Rapid Production (foreground), seven 17" Regals and a 15" Regal. Turn precision parts for milling machines on 24-hour schedule. Dependable, versatile, accurate, cost little to maintain.

tells why he uses LeBlond lathes

No one knows machine tools better than people who build them. And Greaves Machine Tool Company, Cincinnati, builder of milling machines, owns nine LeBlond Lathes! Eight Regals and a Rapid Production.

Since 1941, some of these lathes have worked almost 24 hours a day on full-schedule production for precision milling machine parts, woodworking machine parts and sub-contract work.

Bill Greaves himself says, "*Maintenance costs are extremely small, operators like working on their LeBlonds—because they're easy to operate, convenient, have a great deal of power for their size. Give long sustained accuracy, especially in boring and turning tapers*".

A machine tool man like Bill Greaves knows what he's looking for in a lathe. His opinion counts. When he says our lathes have what it takes, we feel it's a tribute of the highest order!

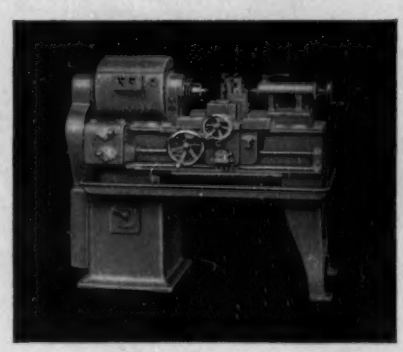
Check the variety of jobs these versatile lathes handle at Greaves. Sound like some of the parts production work in *your* shop? LeBlond Lathes can speed up jobs like these, keep your maintenance costs down to a bare minimum.

LeBlond REGAL Lathes

Light-duty lathes with heavy-duty features—ideal for production, job shop work and training. Geared headstock, quick change feed box, separate leadscrew and feed rod, taper key drive spindle nose, one-piece apron. Swings—13″, 15″, 17″, 19″, 21″, 24″, and 13″ bench model. 17″, 19″, 21″, 24″ Gap and 17″/28″ Sliding Bed Gap. Write for Bulletin R-A, stating sizes you are interested in.

Typical Jobs:

Bushings • Shafts • Armatures • Expansion arbors for mounting gears • Bevel gear blanks • Spindle for universal head • Sleeve gear blanks for Milling Machines • Tumbler for reverse drive • Formica gear blanks (laminated canvas-based gear material)



LeBlond RAPID PRODUCTION Lathes

Designed especially for low-cost high-production turning. Not a stripped-down engine lathe. Choice of headstocks gives you speeds within the range you choose. Swings—13″, 17″ and 20″. Write for Bulletin RP-A, stating sizes you are interested in.

THE R. K. LEBLOND MACHINE TOOL CO., CINCINNATI 8, OHIO

Your nearby LeBlond Distributor will give you all the facts. Call him soon, or write.

turned faster by

LeBLOND *of Cincinnati*

WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES—FOR OVER 64 YEARS.

YES—YOU CAN
HAVE TAPS WITH

BALANCED Action

FOR SPECIAL APPLICATIONS, TOO!

Winter was first to catalog and stock taps for special materials and applications.

These *Taps for Special Applications* are not "altered" stock taps. They are made from start-to-finish for definite applications.

The Balanced Action principle—exclusive with Winter Taps—results from exact flute spacing, uniform flute contours, precision chip driver contours, and accurate and concentric chamfer.

Ask your Industrial Supply Distributor for WINTER CATALOG No. 20, which lists all special application taps carried in stock.

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WINTER BROTHERS COMPANY
Rochester, Michigan, U. S. A.
Distributors in principal cities. Branches in New York, Detroit, Chicago, Dallas, San Francisco, Los Angeles.
Division of National Twist Drill & Tool Co.

Get the edge . . .

Buy National milling cutters with their dependable cutting edges. Let National specify a design exactly suited to the work they must do . . . You'll get the edge in peak production, smooth operation, and long wear.

NATIONAL TWIST DRILL AND TOOL COMPANY

Rochester, Michigan, U.S.A. Distributors in principal cities

Factory Branches: New York, Detroit, Chicago, Dallas, San Francisco, Los Angeles

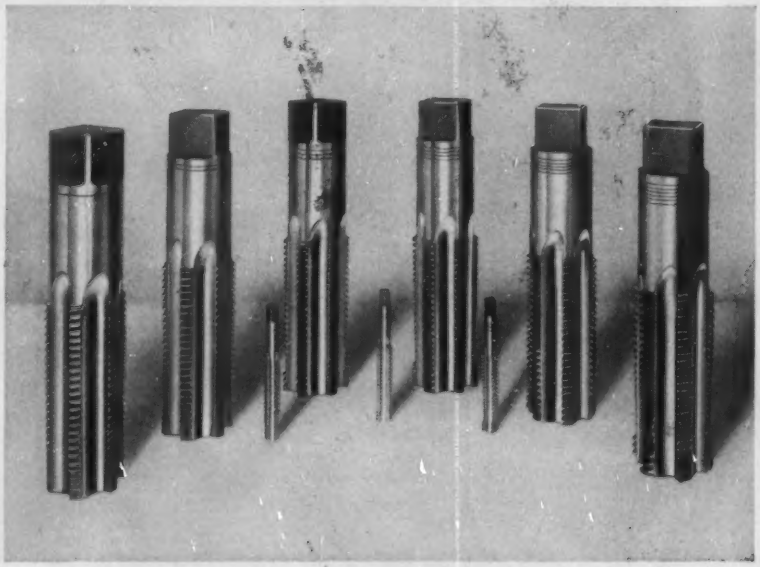
CALL YOUR INDUSTRIAL SUPPLY DISTRIBUTOR

. . . for all your staple industrial needs, including NATIONAL Twist Drills, Reamers, Counterbores, Milling Cutters, End Mills, Hobs, and Special Tools.

SPECIAL TAPS?

Ability of a tap manufacturer is measured not so much by the success of a single sample, as by his ability to duplicate that tap on a production basis. At Detroit Tap & Tool we utilize a unique system that records every detail of every special tap manufactured.

Detroit Special Taps are Tops for a Good Reason...



This record system controls quality right from your first order. It is your guarantee that, having found the "right" tap for the job, you will get the same results with every additional tap you order.

Such records minimize the development of special taps. Often, the new problem is so similar to a previous one—already a matter of record—that a minimum of research and engineering is required for the new tap. The advantage of such service is obvious.

See your Detroit Tap & Tool Company representative today. Stocking distributors are located in major industrial areas.

DETROIT TAP & TOOL CO.

8615 E. EIGHT MILE RD., BASELINE, MICHIGAN

Another COVEL 80th Anniversary Presentation

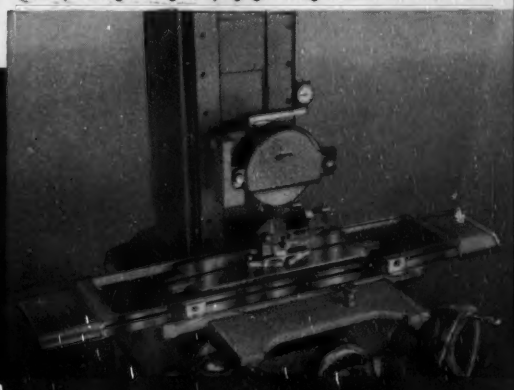
The New COVEL NO. 10

LOW COST POWER AND HAND FEED SURFACE GRINDER

This all-new 6" x 18" Surface Grinder is designed to provide low cost precision gage and form tool work, as well as surface grinding. It will grind work 6" x 18" x 15" under a 7" diameter wheel, has table speed of 10 to 50 feet per minute and longitudinal table travel of 20". Table is driven by special timing belt eliminating rack and gear. Its automatic cross feed is adjustable from .002 to .050 at the end of each table stroke. The grinding wheel head uses any popular make 1 H.P., 3600 RPM direct motor driven spindle. Hand scraped ways, dust proof motor control enclosure, one shot lubrication system, rugged construction with heavily-ribbed semi-steel cast base all go to make the Covel No. 10 outstanding as a tool room surface grinder.

Send for Bulletin AM-124

Set-up for grinding snap gage using indicators and rods.



80 YEARS of continuous manufacturing experience makes your COVEL choice a sound one.

COVEL PRECISION GRINDERS

BENTON HARBOR, MICHIGAN

DRILL GRINDERS • UNIVERSAL CUTTER & TOOL GRINDERS • HYDRAULIC & HAND FEED SURFACE GRINDERS

Jarvis TORQOMATICS

AN INDUSTRIAL MACHINE FOR INDUSTRIAL USERS

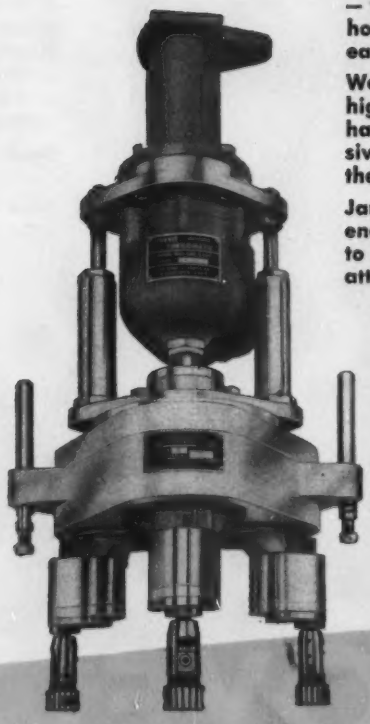
can do your tapping jobs better!

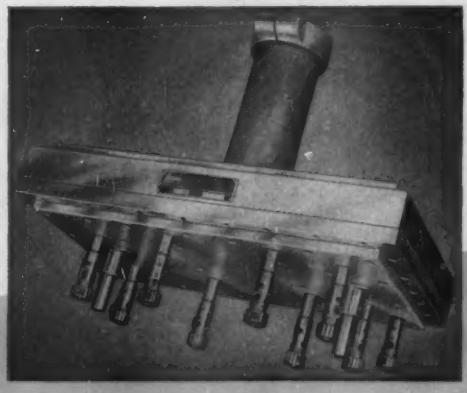
A complete range of Jarvis Torqomatics and Multi-Tapping and Drilling Heads — available to fit any type drill press or tapping machine.

You'll like their trouble-free performance — their ability to produce quality threads — their increase in tapped holes per hour, the savings in taps — and their ease of operation!

We invite your inquiries about these highly efficient Jarvis machines that have outmoded all other slow, expensive and highly perishable machines of the past.

Jarvis Torqomatics are priced low enough to make it economically possible to replace your old tapping devices and attachments.





A Jarvis representative will be glad to consult with you — no obligation.

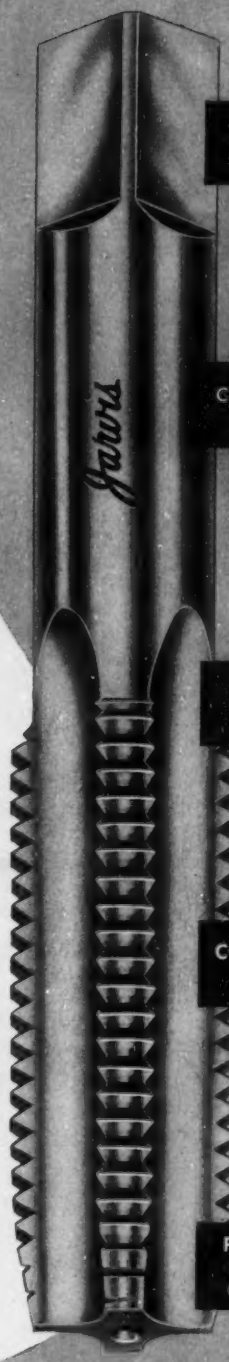
Send for Complete Catalog

THE CHARLES L. JARVIS CO.

MIDDLETOWN IN CONNECTICUT

Jarvis TAPS

AN INDUSTRIAL TAP FOR INDUSTRIAL USERS



ACCURATE SQUARES

CONCENTRIC SHANKS

UNIFORM FLUTE SPACING

CONTROLLED HOOK

PRECISION GROUND CHAMFER

have "Custom Made" Cutting Edges at NO EXTRA CHARGE

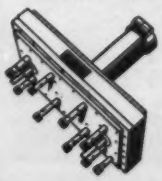
"Custom Made" means just that! Accurate indexing and precision machine grinding of flute and spiral points on Jarvis Taps produce a tool in which ALL the cutting edges do their share of the work. Our highly accurate fluting process makes it possible for us to control for your PARTICULAR NEEDS the amount of hook ground in the flutes. Specify Jarvis, and you'll always have "Custom Made" Taps designed to do a specific job superbly well.

Send for complete New 56 page Tap Catalog and Manual.

Jarvis Manufacturers of . . TAPS

TORQOMATICS

MULTI-TAPPING AND DRILLING

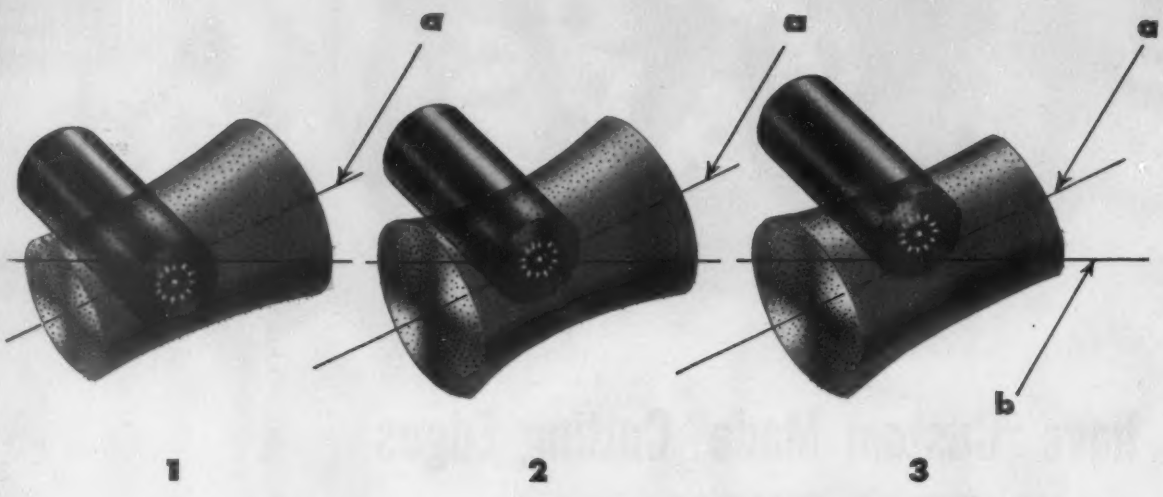


CARBIDE TOOLS

FLEXIBLE SHAFT MACHINES

ROTARY FILES & MOUNTED POINTS

THE CHARLES L. JARVIS COMPANY, MIDDLETOWN IN CONNECTICUT



misalignment is expensive

...Bryant controlled alignment

USERS of internal grinders generally believe that once the grinding wheel passes the diamond, the form of the wheel will be a perfect cylinder and this wheel will then grind a straight hole. If the wheelhead is tipped so that its center line is not parallel with the motion of the longitudinal ways, the wheel cannot be trued to a perfect cylinder. In our illustration each wheel is tipped as it passes the diamond. Even though the diamond describes a straight line across the surface of the tipped wheel, the wheel will not be trued to a perfect cylinder. This is because the wheel is not being moved on a path along its own center line. When the wheel is tipped so that its center line "a" does not coincide with its direction of travel "b" as the wheel passes the diamond, an apparent taper "1" or "3", or an hour-glass "2" will be generated on the wheel. The vertical position of the diamond determines which one of these three forms will be produced on a tipped wheel. In this case we have two variables; that is, the wheel axis "a" may not coincide with its direction of travel "b", and the diamond may be above or below center.

Write for "Alignment" booklet which gives complete details on this interesting subject. Also ask for booking form on new sound, color movie—free showings arranged for engineering groups.

This No. 2209 Bryant Internal Grinder is equipped for shoe centerless internal grinding. It is especially useful in applications where close tolerances are required for concentricity, bore roundness and squareness where previous O. D. and face grinding operations have been closely controlled. The No. 2209 can accommodate workpieces from 1" to 3½" O. D. The machine cycle is fully automatic and is controlled by a combination of cams and levers. The left end of the workhead can be raised or lowered to bring its axis into a plane parallel with the wheelslide bar. The rear of the wheelslide can be adjusted to insure straight line motion of the wheel. Loading can be automatic or manual. Write for folder.

gives better internal grinding

Taper due to tipping of the wheel can be identified by raising or lowering the diamond. If the wheel is tapered as in "1" and after raising the diamond the form changes to "2" and again, after raising the diamond, the taper changes to "3", the front of the wheel (left end in illustration) is low and the wheel is tipped down. On the other hand, if the small diameter of the taper moves from right to left on the wheel as the diamond is progressively raised, the front of the wheel is tipped up.

An error in wheel form similar to those illustrated cannot produce a good hole either for size or shape, since there can be no straight line of contact for the full length of the wheel and the full length of the work as the wheel traverses. Furthermore, this distortion in the form of the wheel cannot be eliminated by simply turning the workhead. The remedy is to correct the alignment by bringing the wheel center line parallel with the wheel path (direction of wheel travel) and to the same height as the workhead center line, and setting the diamond in the plane established by the wheelhead and workhead center lines.

see our catalog in MACHINE TOOL CATALOGS or write for copy

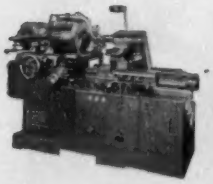
Bryant Chucking Grinder Co.
Springfield, Vermont, U. S. A.

Internal Grinders • Boring Machines • Internal & External Thread Gages • Granite Surface Plates

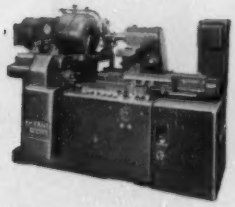
no. 1109 9" swing, semi-automatic

no. 1309-W 9" swing, 2 spindle semi-automatic

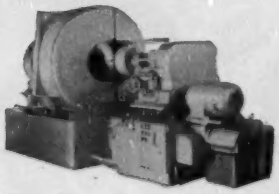
no. 2209 9" swing, automatic



no. 1116 16" swing, semi-automatic

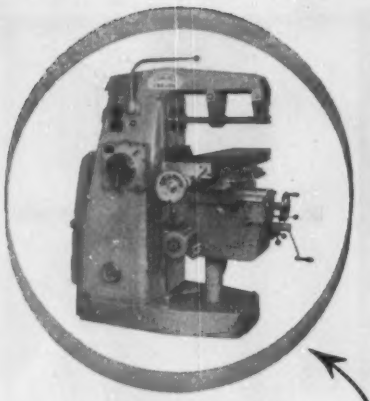


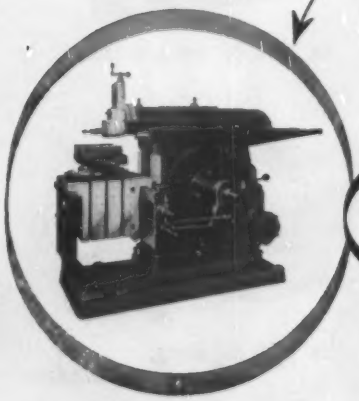
no. 3216 16" swing, automatic



no. 1460 60" swing, semi-automatic

Swedish Craftsmanship!





headquarters

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Austin is American headquarters for the fine machine tools that are manufactured in the modern Swedish machine tool center of Värnamo.

Built with the painstaking workmanship and quality materials that characterize Swedish products, these machine tools, since their introduction in the U.S.A., have earned an enviable reputation for accuracy and dependability in toolroom and production line. All machines comply fully with U. S. Standards.

SAJO #2 ALL GEARED MILLING MACHINES — plain and universal models — light and standard types, all built to modern design to meet industry's demand for fast, simplified operation while maintaining maximum accuracy. Available with longitudinal power feed only or with power feed and rapid traverse in all directions. Offered with full line of accessories.

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PREMA 13" SHAPER — a "mighty mite" — ideal for applications where large shapers are not justified. "Big Shaper" performance and accuracy at modest cost makes the Prema a profitable addition in the toolroom or on light production work.

VMA SHAPERS are available in both standard and heavy duty models — 14" to 26" length of stroke. These rugged amply powered machines provide speedy set-up, ease of operation and maximum stamina in the toolroom or production line. Automatic lubrication and table power rapid traverse are standard on heavy duty models. Universal table and other accessories are available.

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CUT ANY METAL to close

Stroboscopic photo "stops" wheel for 1/10,000 of a second. (Guards removed to show detail.)

continually putting more sense in your abrasive dollar...

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tolerance . . . IN SECONDS!

with Abrasive CUT-OFF Wheels by CARBORUNDUM

Cut off any metal in seconds . . . ferrous or non-ferrous . . . annealed or unannealed . . . in solid bars, thin or heavy walled tubes, or sheets up to 4″ thick . . . with Abrasive Cut-Off Wheels by CARBORUNDUM. The right wheel on the correct machine cuts from 12 to 20 times as fast as a power hacksaw, eliminates extra grinding, milling or other finishing operations usually required after shearing or flame cutting. You can figure on 6 seconds per square inch as average cut-off time on solid steel bars with up to 3 square inches of cutting surface, for example.

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CARBOFLEX CUT-OFF WHEELS are the newest in CARBORUNDUM's complete line. They are fabric-reinforced to give adequate safety in the most severe cutting off operations. They cut fast, effectively . . . are best for portable operations, such as cutting or slotting gates and risers. undercutting heavy welds, and general cut-off and slotting. CARBOFLEX Cut-Off Wheels are available in diameters from 6″ to 20″—in both Silicon Carbide and Aluminum Oxide.

RESINOID BOND CUT-OFF WHEELS by CARBORUNDUM for dry cutting at high speeds do an effective job when fast production is more important than quality of cut—and when initial investment in cut-off machines must be kept low. On 1″ diameter bar stock you can hold length to plus or minus .020″ with ease, because CARBORUNDUM® Brand Resinoid Cut-Off Wheels are scientifically controlled in manufacture to insure balance, running truth and straightness.

YOUR CARBORUNDUM DISTRIBUTOR OR SALESMAN is ready to assist you . . . to put abrasive cutting to work, profitably, in your plant. Call him today—he's listed under "Abrasives" or "Grinding Wheels" in the yellow pages of your telephone directory. Or write to The Carborundum Company, Dept. AM 81-43, Niagara Falls, N. Y.

CARBORUNDUM

81-43

Here's another reason it pays to get a proposal from Fosdick

"Lathe Bed Production Time Slashed 6 hrs."

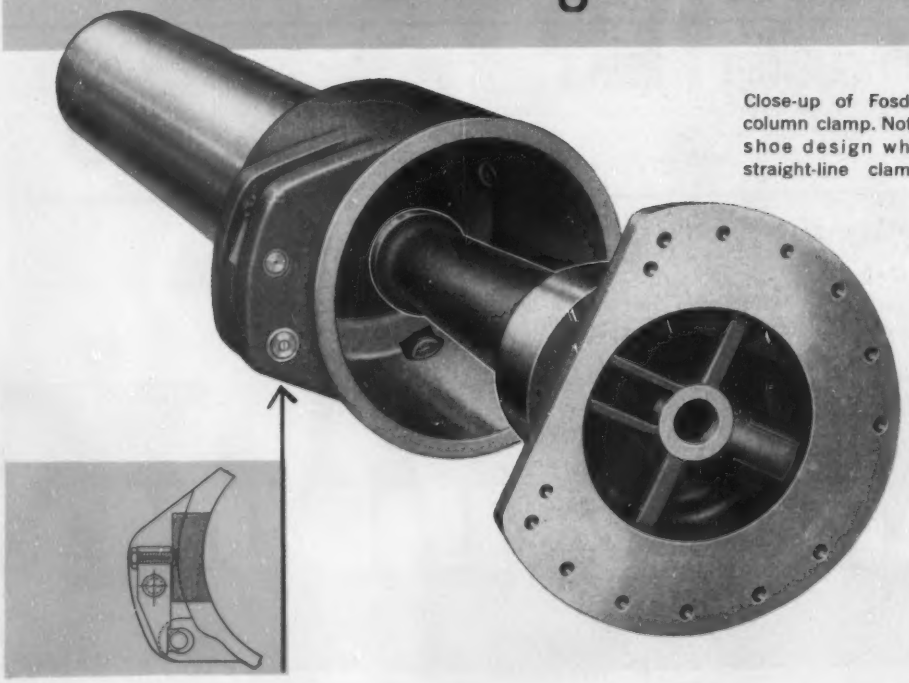
"Since installing our new FOSDICK"...

says Sidney Machine Tool Co.

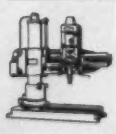
"Our new Fosdick Radial is easy to handle, requires less time for job set-ups. And its operating advantages are numerous. Formerly, we put 28 hrs. into drilling our 28′ lathe bed. But with our new Fosdick Radial Drill, we've cut drilling time by 6 hours . . . saved valuable production time! We've found that it pays to get a proposal from Fosdick."

Fosdick Hydraulic Radials are available with 3′ to 8′ arms, 11″ to 19″ columns. For full information, ask for Bulletin ATA.

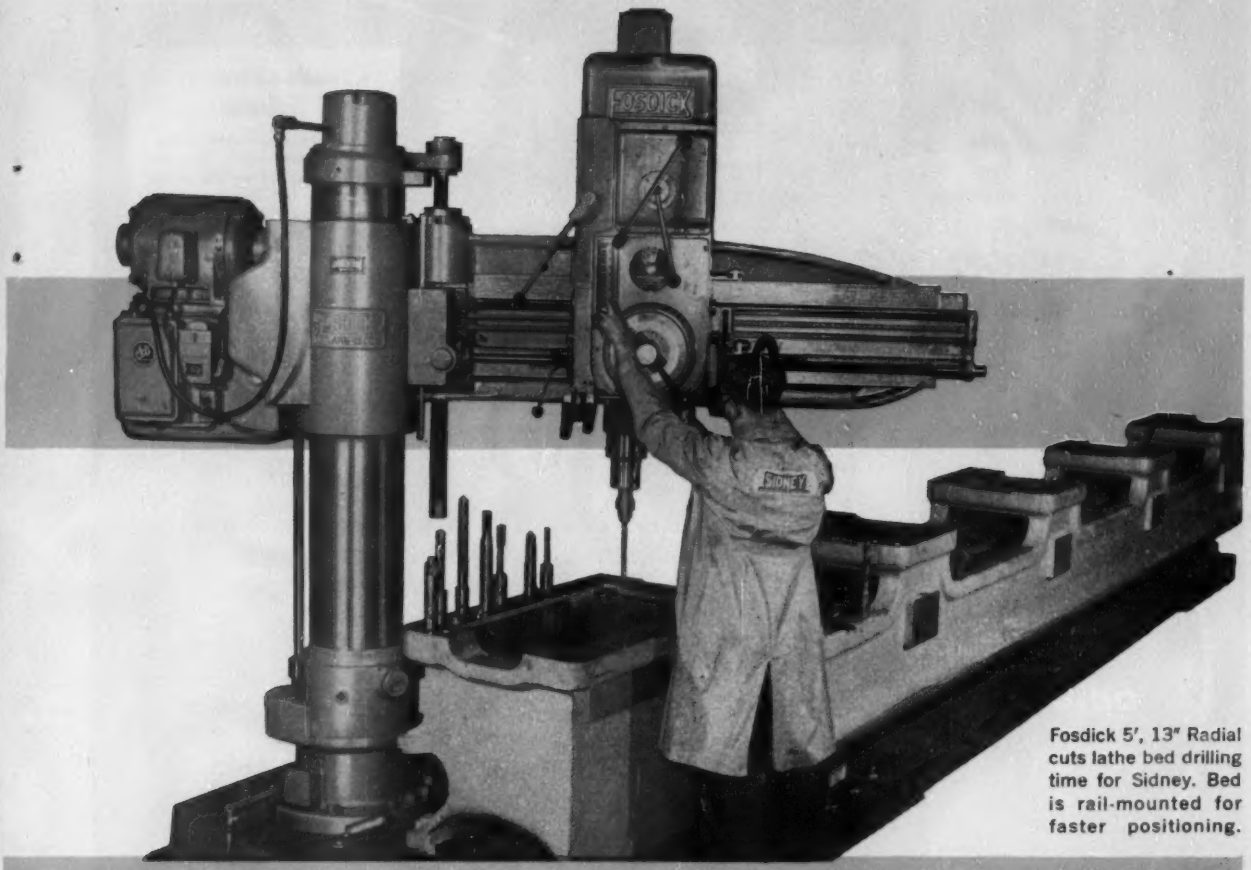
Fosdick Radials give Faster Drilling...



Close-up of Fosdick hydraulic column clamp. Note the sliding-shoe design which gives it straight-line clamping action.



Radial Drills



Fosdick 5', 13" Radial cuts lathe bed drilling time for Sidney. Bed is rail-mounted for faster positioning.

More Rigidity . . . Easier Handling.

Fosdick Radials give you many features that insure fast, rigid, precision drilling. To name a few:

Hydraulic Column Clamp. New sliding-shoe design gives rigid straight-line clamping action. Prevents side movement of column for sustained accuracy and speed of drilling.

Locking Control. With this feature, set-up time is reduced to a minimum. When feed mechanism is engaged, an automatic interlock clamps the head and the column. When feed is disengaged, clamping is maintained. This permits the operator to change tools without disturbing the position of the head. Clamping is disengaged by independent levers.

Tool Ejector. For speedy tool removal all the operator has to do is to move the spindle to its extreme upper position. This automatically disengages the tool. No drifts or hammers necessary.

Automatic Positioning Table. Now, available for use with radial drills! Without jigs, the Fosdick Automatic Positioner makes possible exact reproduction of precision drilled, bored, tapped and reamed parts . . . within tenths! For details write for Bulletin AT-A.

Need Drilling Equipment? Get a Proposal from Fosdick!

Jig Borers

Sensitive and Upright Drills

Sensitive Radial Drills

Automatic Positioning Machines

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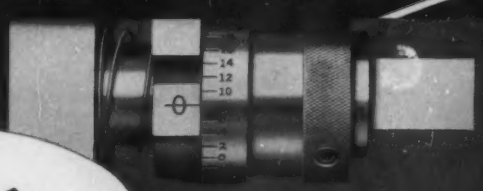
THE FOSDICK MACHINE TOOL CO., CINCINNATI 23, OHIO



blade clearance indicator

. . . precise adjustment, easily and quickly made by the operator, gives correct blade clearance for any gauge or type of metal, minimizes burrs and greatly prolongs blade life.

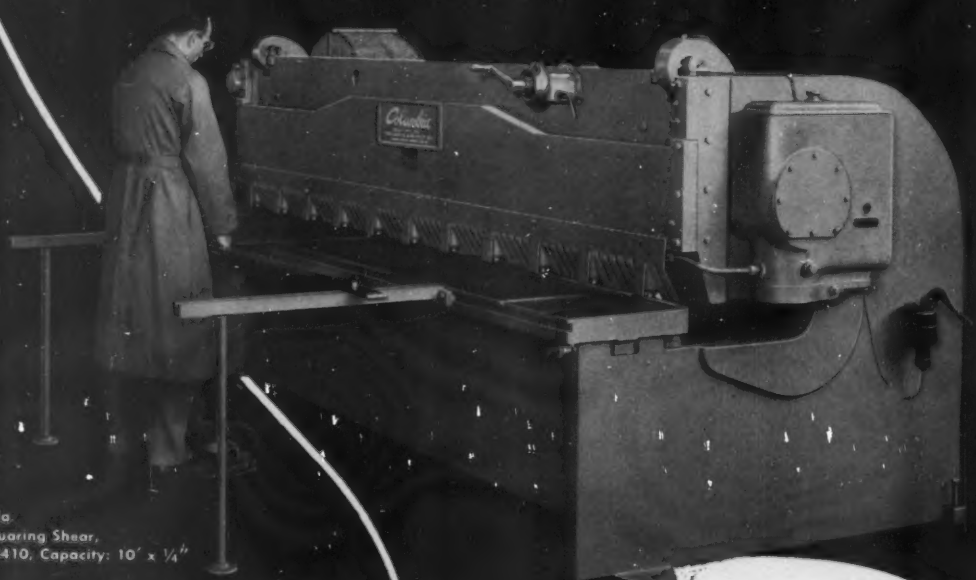
another **Columbia** shear feature

quick-set blade clearance adjustment

Columbia "New Series" steel squaring shears have many features specifically designed and refined to give low-cost, trouble-free operation.

The Blade Clearance Indicator, for example, lets the operator adjust blade clearance quickly and easily. This feature eliminates waiting for supervisory personnel, gives burr-free shearing on any gauge metal and significantly increases blade life.

Other Columbia features you should know about include the exclusive air clutch, hydraulic hold-downs, jog control for ram and others. Combine these with basic rigidity, rugged mechanism and long-lasting accuracy and you have the answer to low-cost shearing . . . the Columbia "New Series" Shear.

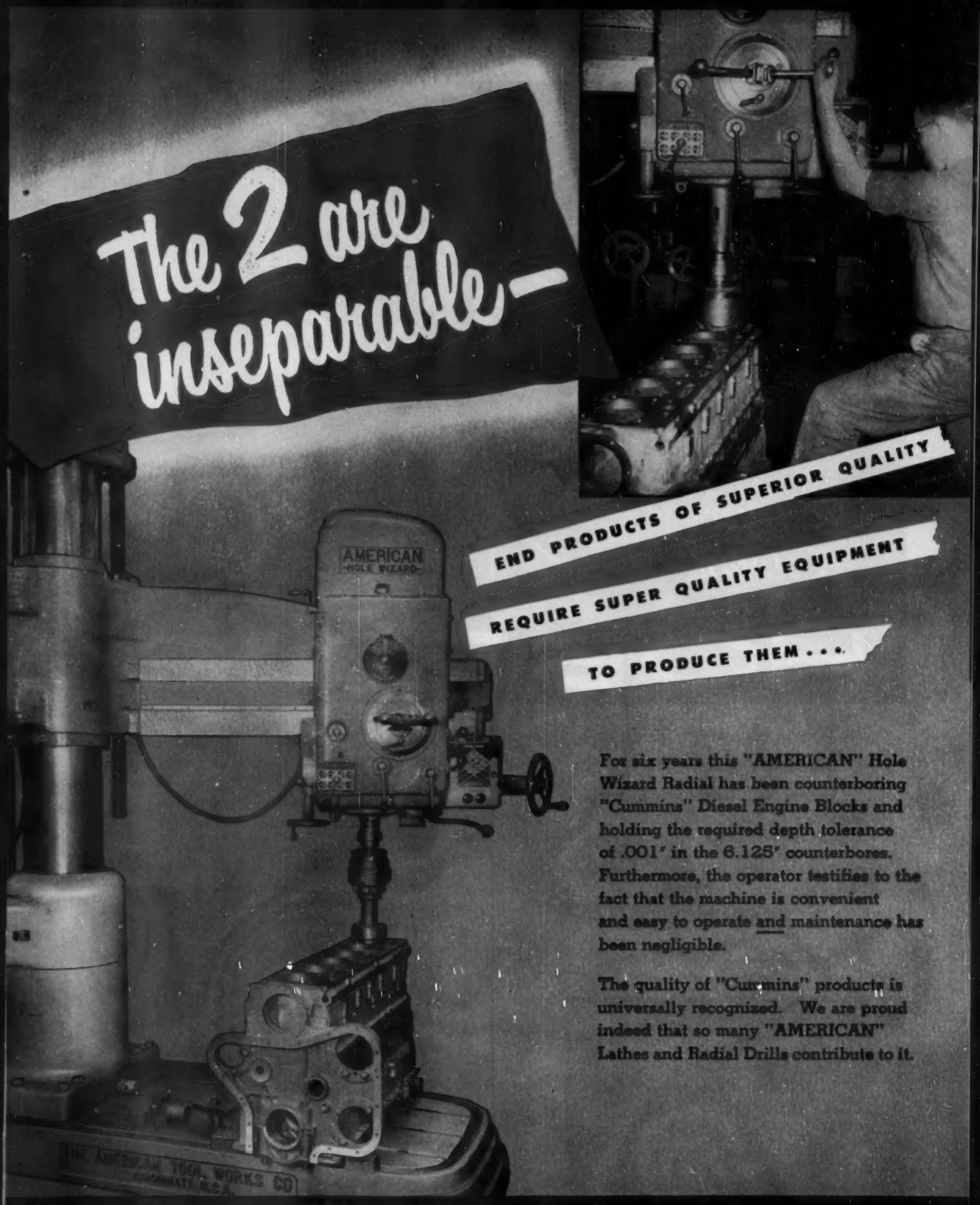


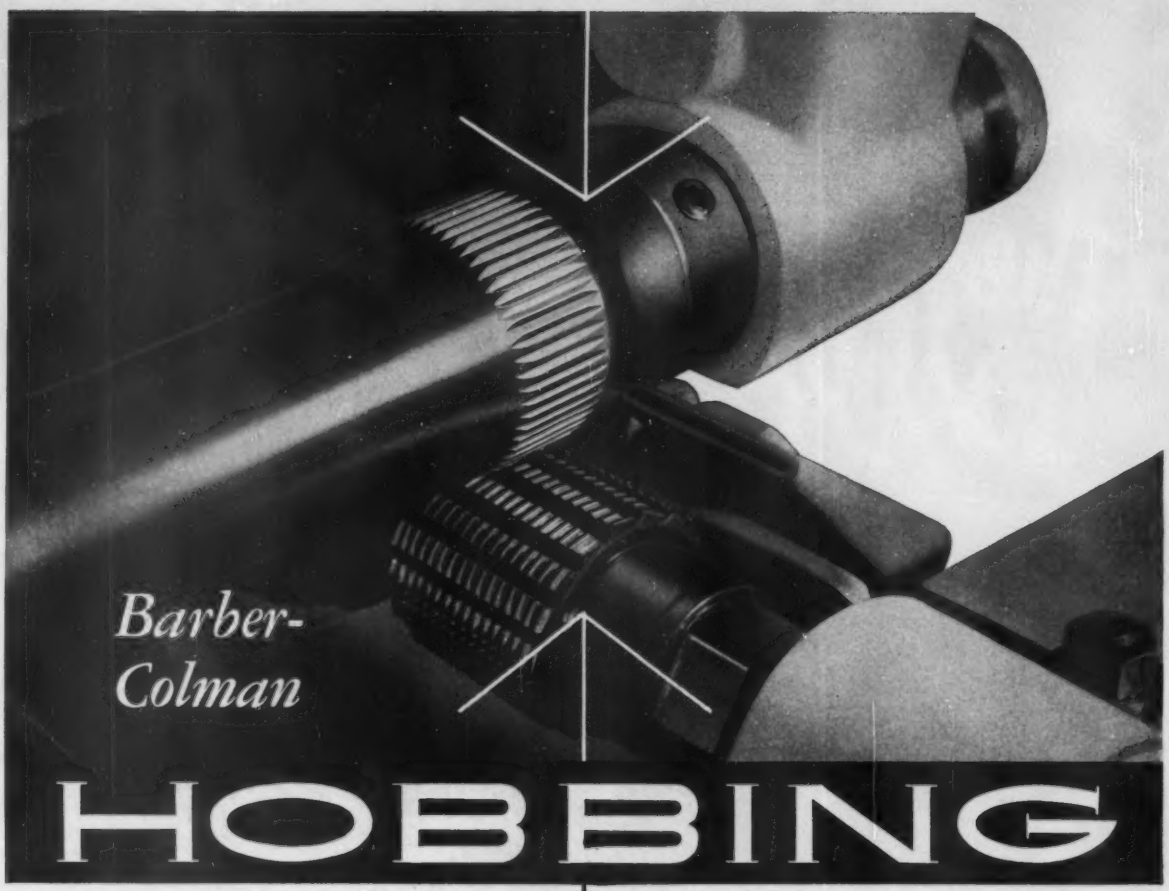
Columbia
Steel Squaring Shear,
Model 0410, Capacity: 10′ x ¼″

Other exclusive Columbia features are explained in detail in FREE Bulletin No. PS-1. Write for it and the name of your Columbia distributor today!

Columbia Division, The Lodge & Shipley Co.
Hamilton 2 Ohio

new series **Columbia** STEEL SQUARING SHEARS and POWER PRESS BRAKES


The 2 are inseparable—
AMERICAN
HOLE WIZARD
END PRODUCTS OF SUPERIOR QUALITY
REQUIRE SUPER QUALITY EQUIPMENT
TO PRODUCE THEM . . .
For six years this "AMERICAN" Hole Wizard Radial has been counterboring "Cummins" Diesel Engine Blocks and holding the required depth tolerance of .001" in the 6.125" counterbores. Furthermore, the operator testifies to the fact that the machine is convenient and easy to operate and maintenance has been negligible.
The quality of "Cummins" products is universally recognized. We are proud indeed that so many "AMERICAN" Lathes and Radial Drills contribute to it.
THE AMERICAN TOOL WORKS CO. Cincinnati 2, Ohio, U. S. A.
LATHES AND RADIAL DRILLS



HOBBING

Doubles Tool Life,
Cuts Production Time...

Barber-Colman Hobbing Engineers, working closely with the customer on this job, combined hobs, tooling and machines for substantial tool savings and increased tool life.

New No. 16-16 Hobbing Machines, engineered with special tooling particularly for this job, are used to cut serrations on shaft ends 45-50 R.C. hardness, which approaches the upper limit of hardness for hobbing. Multi-thread Class C Accurate Unground hobs reduce tool costs considerably. The hobs are automatically shifted after each cut, resulting in an increase of 55 hobbed ends per sharpening in this hard material.

For most efficient results in tool life, production, low cost and accuracy control, hob your jobs on No. 16-16 Hobbing Machines.

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There are lots of ways to

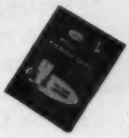
PIERCE METALS

...But here's

Precision Multiple Piercing at Lower Cost

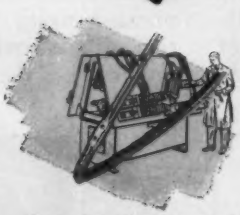
DANLY HYDRAULIC METALWORKING EQUIPMENT

Pierce metal faster, with greater accuracy and at less cost. In a single setup for multiple piercing . . . or riveting, punch extruding or trimming . . . you can reduce costly handling by combining operations into a single setup. Danly Hydraulic Metalworking Equipment is engineered to meet your specific needs. Exclusive all-hydraulic action permits smooth operation, minimizes break-through shock, automatically strips each station and simplifies fixturing. Find out more about high production multiple hole piercing in a single setup—write today for special Danly Hydraulic Metalworking Equipment Bulletin.

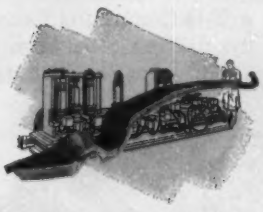


DANLY MACHINE SPECIALTIES, INC.

2100 South Laramie Avenue • Chicago 50, Illinois



One setup pierces seven irregular holes and trims this car door inner window frame.



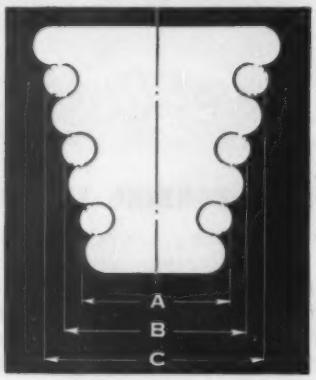
40 holes are pierced simultaneously in this automotive frame member on a Danly machine.

Irregular holes are pierced fast and accurately in this stainless steel jet engine part.

New Taft-Peirce CompAIRator Air Gage

Measures and Computes

4 DIMENSIONS SIMULTANEOUSLY

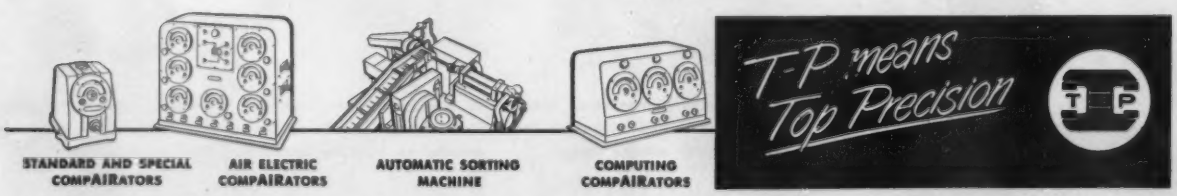


The CompAIRator above checks serrations in the root section of jet engine turbine blades. Does automatically and instantly what formerly took skilled hands many minutes to do.

Three of the air indicators measure thickness "over rolls" of the serrated sections. At the same time, a T-P Computing CompAIRator computes the difference between two of these dimensions and compares it to a standard value. If the variation is greater than plus or minus .001" on the dial, the part is rejected. Most important of all, the serrations can be checked over their entire length.

Two different models of this gage have been built. One permits gaging with the part in the grinding fixture — thus eliminating many costly rejects. The other serves as a final inspection gage.

This unit is typical of the hundreds of Taft-Peirce CompAIRators now simplifying complicated gaging operations. For more information on this and many other items, send for your copy of the Taft-Peirce Handbook.



THE TAFT-PEIRCE MANUFACTURING COMPANY, WOONSOCKET, R. I.

"He who makes no mistakes does nothing"

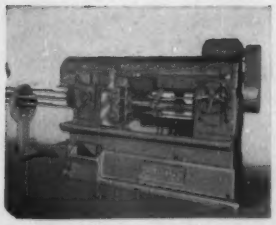
In a supposedly modern era it is sometimes claimed to be "smart business" to let a competitor take the lead and make profit from his mistakes. Obviously, if all business adhered to such a philosophy there would be no progress, if any business. "He who makes no mistakes does nothing". Cone leadership was founded — and is maintained — by active service, by doing things.

The Conomatic Carbide Development program expects to make a few mistakes. But, loss or gain, its efforts will contribute to the general benefit of all "automatic" users, users on whom all "automatic" builders are dependent.

The job illustrated compares actual production runs with HSS and 100% carbide tooling. It suggests the kind of pioneering that is being done at Cone. Full details are available.

MATERIAL—1112 STEEL: Hole drilled with 1" dia. drill to 2¼" depth. OD threaded to 2" length with 1¼"—12 chasers.

	HSS	CARBIDE
Cycle Time	90 secs.	**15 Secs.**
Work Spindle Speed	370 R.P.M. at 103 S.F.	**1500 R. P. M. at 417 S. F.**
Tool Wear	1500 pcs. per grind	**5000 pcs. per grind**

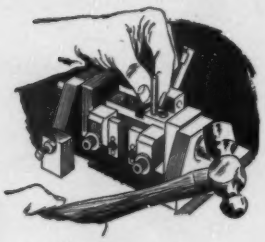


Conomatic }

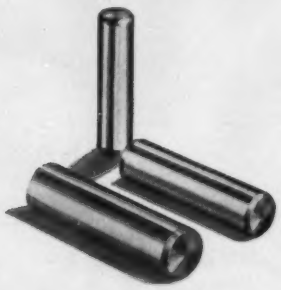
CONE AUTOMATIC MACHINE COMPANY, INC.
WINDSOR, VT., U.S.A.

UNBRAKO Precision-Ground Dowel Pins are widely used for aligning parts, as in dies, jigs and fixtures. This radius grinding fixture, for putting a flat on electronic shafting, is a good example of such an application.

Assembler inserts formed end of UNBRAKO dowel pin into hole preparatory to tapping it into position.



Formed ends, with continuous grain flow, won't chip. Uniform heat treatment permits UNBRAKO dowel pins to be driven in and out of holes without upsetting.



UNBRAKO dowel pins—made of heat treated alloy steel—have a surface hardness of 60-62 Rockwell "C" Scale; a surface finish of 6 microinch maximum; a core hardness of 50-54 Rockwell "C" Scale; an average single shear strength of 150,000 psi; and a diameter tolerance of ±0.0001". They are available in two standard sizes in diameters from ⅛" to 1".

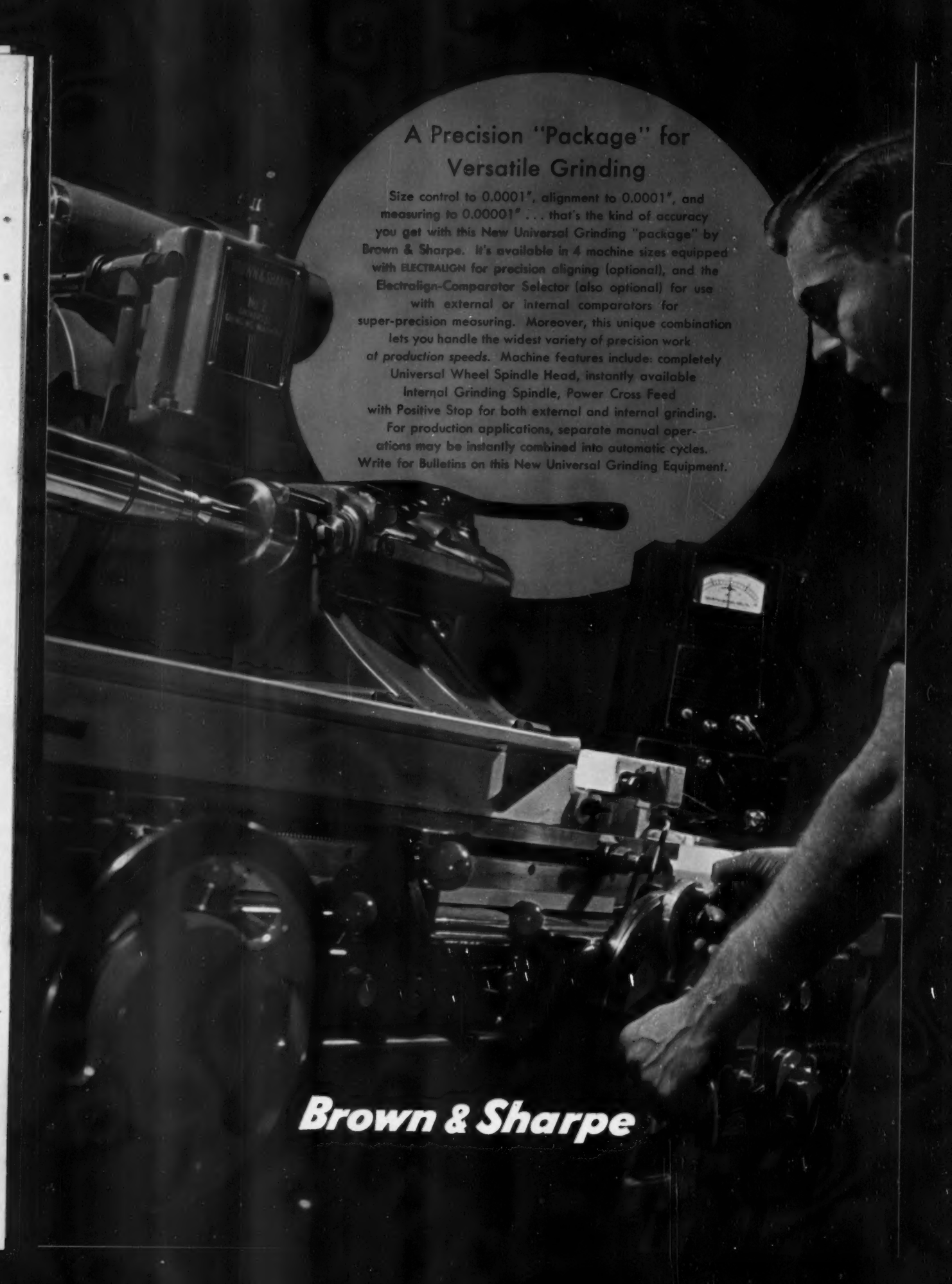
Keep your inventory at a minimum

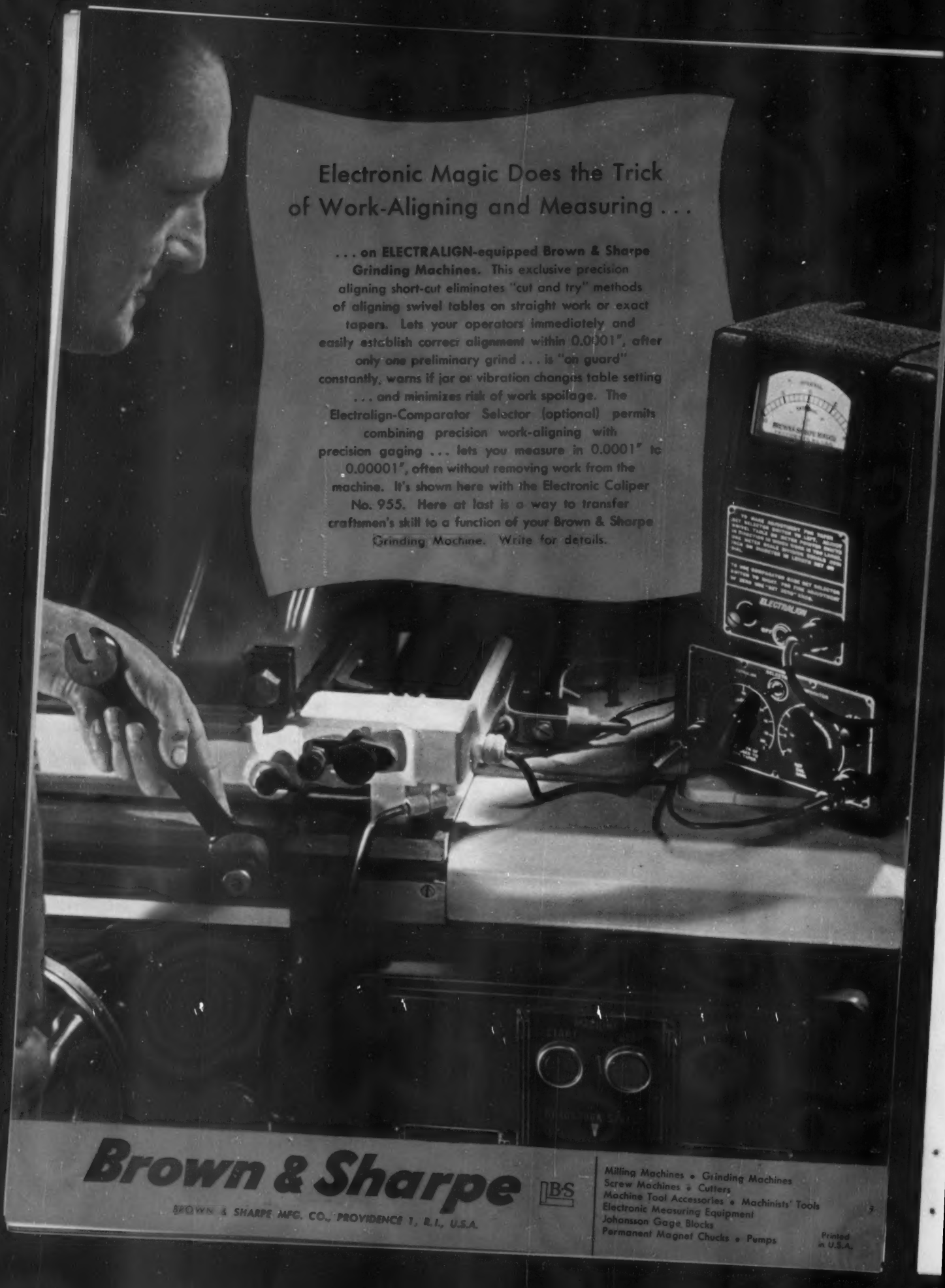
Use UNBRAKO Standards—stocked by your distributor

Because your UNBRAKO distributor stocks a full line of standard UNBRAKO socket screw products, your inventory is lowered. This ready supply not only cuts your investment, but gives you faster delivery and reduces your buying costs. For a complete listing of standard UNBRAKO products, see your distributor or write STANDARD PRESSED STEEL CO., Jenkintown 1, Penna.

UNBRAKO® SOCKET SCREW DIVISION

SPS JENKINTOWN PENNSYLVANIA


A Precision "Package" for Versatile Grinding
Size control to 0.0001", alignment to 0.0001", and measuring to 0.00001" . . . that's the kind of accuracy you get with this New Universal Grinding "package" by Brown & Sharpe. It's available in 4 machine sizes equipped with ELECTRALIGN for precision aligning (optional), and the Electralign-Comparator Selector (also optional) for use with external or internal comparators for super-precision measuring. Moreover, this unique combination lets you handle the widest variety of precision work at production speeds. Machine features include: completely Universal Wheel Spindle Head, instantly available Internal Grinding Spindle, Power Cross Feed with Positive Stop for both external and internal grinding. For production applications, separate manual operations may be instantly combined into automatic cycles. Write for Bulletins on this New Universal Grinding Equipment.
Brown & Sharpe


Electronic Magic Does the Trick
of Work-Aligning and Measuring . . .
. . . on ELECTRALIGN-equipped Brown & Sharpe Grinding Machines. This exclusive precision aligning short-cut eliminates "cut and try" methods of aligning swivel tables on straight work or exact tapers. Lets your operators immediately and easily estcblish correct alignment within 0.0001", after only one preliminary grind . . . is "on guard" constantly, warns if jar or vibration changes table setting . . . and minimizes risk of work spoilage. The Electralign-Comparator Selector (optional) permits combining precision work-aligning with precision gaging . . . lets you measure in 0.0001" to 0.00001", often without removing work from the machine. It's shown here with the Electronic Caliper No. 955. Here at last is a way to transfer craftsmen's skill to a function of your Brown & Sharpe Grinding Machine. Write for details.
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BROWN & SHARPE MFG. CO., PROVIDENCE 1, R.I., U.S.A.
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Milling Machines • Grinding Machines
Screw Machines • Cutters
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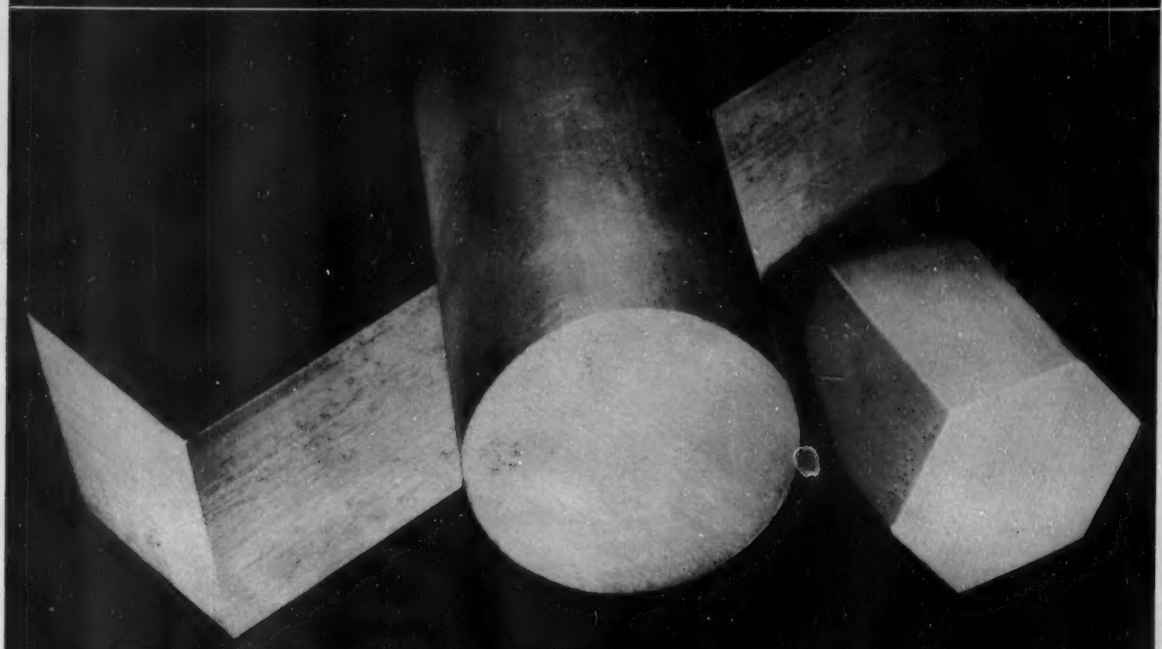
Printed in U.S.A.

WHY IT PAYS TO BUY STAINLESS BARS FROM US



You get the widest selection
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What you want
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• You can greatly simplify your buying of stainless steel bars by calling the nearest U. S. Steel Supply warehouse. Our warehouses offer the widest selection of top quality bars ready for immediate delivery. These bars are made from USS Stainless Steel—produced under the strictest quality control from ore to finished product—so you're sure of getting the exact grade you specify.

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Gentlemen:
Please send me, without obligation, your literature containing complete information on your stainless steel stocks and service.

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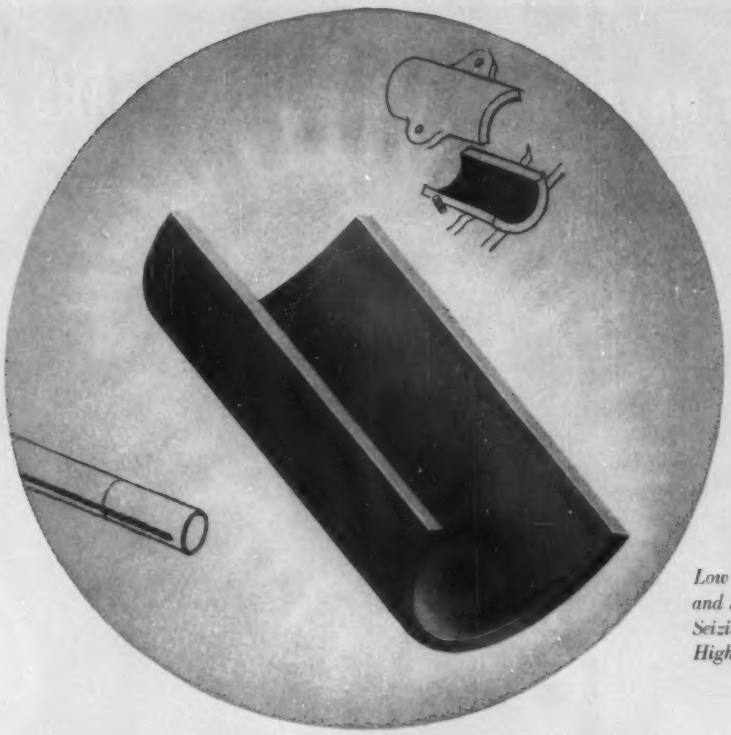


Low Friction Bushings and Sleeves Resist Seizing, Abrasion, High Temperatures

HAYNES STELLITE Bushings and Sleeves

Trade-Mark

...for handling Hot-Abrasive Materials

Bearing parts made of HAYNES STELLITE alloy resist seizing and galling. They are hard and abrasion resistant, and will withstand the pitting effects of many corrosives. They take a high polish and are easy to apply. Use them to reclaim worn shafts or bearing blocks, and to lengthen the life of new equipment.

Operate with Little or No Lubrication

Sleeves made of HAYNES STELLITE alloy can be used in areas where efficient lubrication is impossible. They resist seizing even when lubricants are diluted by gasoline, cleaning fluids, and other liquids that wash out an oil film. They operate at peak efficiency even when lubricants decompose under heat, or are destroyed by abrasive particles.

Tough and Abrasion-Resistant

Bearing parts made of HAYNES STELLITE alloy resist the abrasive effects of wet or dry materials such as fly ash, coke, metal powder, shale, and cement dust. They are hard enough to carry heavy loads, and tough enough to stand up under repeated stress.

Heat and Corrosion Resistant

These bushings and sleeves can be submerged in many acids, alkalies, and molten metals. Temperatures as high as 1500 deg. F. have little effect on their hardness, toughness, and dimensional stability.

For more information write for our 8 page booklet on half bushings and sleeves.

"Haynes" and "Haynes Stellite" are registered trade-marks of Union Carbide and Carbon Corporation.

HAYNES TRADE-MARK ALLOYS

HAYNES STELLITE COMPANY

A Division of Union Carbide and Carbon Corporation

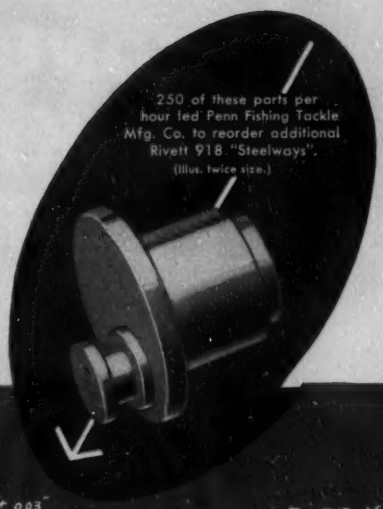
UCC

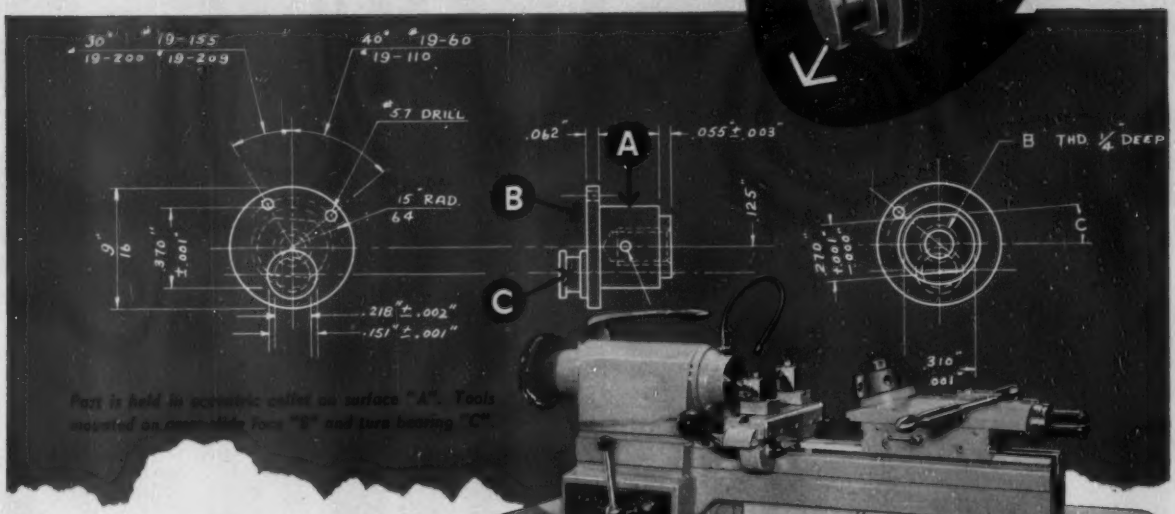
General Offices and Works, Kokomo, Indiana

Sales Offices

Chicago • Cleveland • Detroit • Houston • Los Angeles • New York • San Francisco • Tulsa

INSTANT start-stop boosts Penn Fishing Tackle parts to 250 per hour!

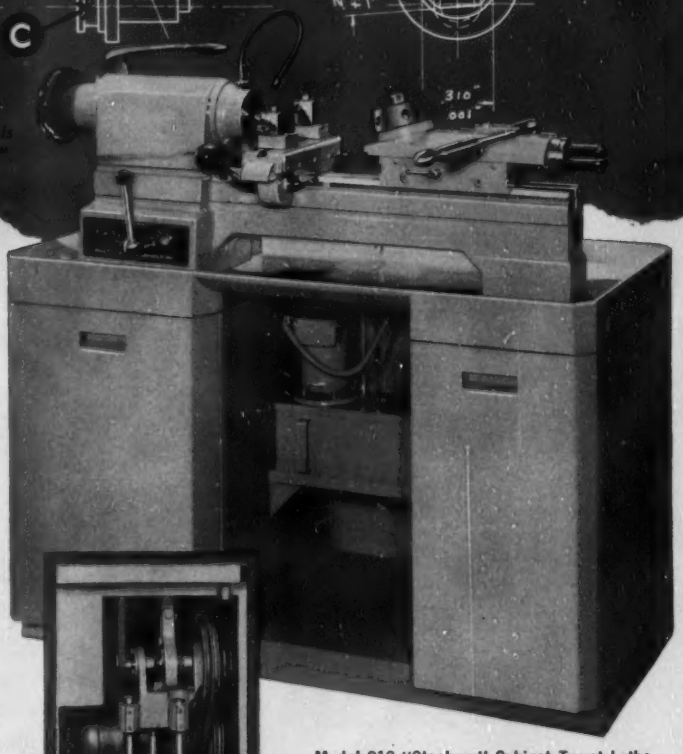




Penn Fishing Tackle Mfg. Co. practices what it preaches. Its officials went fishing recently —to catch some ideas for stepping up production on several eccentric parts. Investigation of the Rivett 918 "Steelway" Cabinet Turret Lathe revealed that machine with its production drive was ideally suited to their requirements.

This production drive features "split-second" starting and stopping of the lathe spindle by movement of the lever chuck closer handle. With one forward pull, the operator closes the collet on the work, releases the brake and engages the spindle drive. When the lever is pushed back, the spindle drive is disengaged, the brake mechanism is applied and the work is released.

Installation of the 918 "Steelway" turret proved immediately successful. Production of troublesome parts was boosted two-fold. A 918 "Steelway" can boost your production, too! Why not go fishing and see what savings can be caught!



Model 918 "Steelway" Cabinet Turret Lathe.

← *Insert shows production drive.*
Motor runs continuously regardless of number of times spindle is started and stopped, thus eliminating overheating of motor.

RIVETT

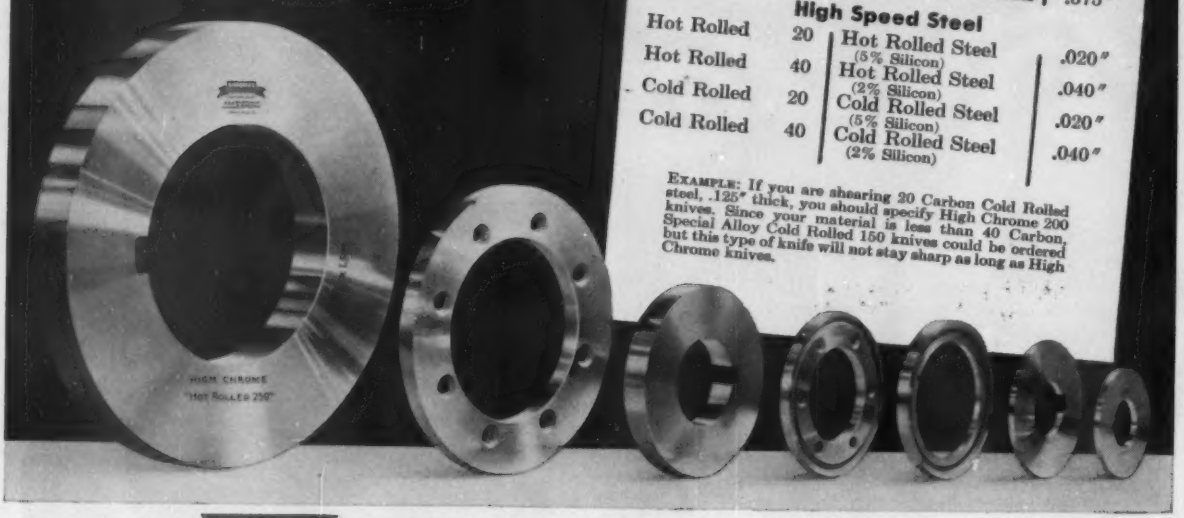
RIVETT LATHE & GRINDER, INC., DEPT. AMR 6. BRIGHTON 35, BOSTON, MASS.

SIMONDS Shear Knife SELECTOR CHART

helps you pick the BEST for your job!

Name and Number of Knife		For Shearing	Max. Thickness in Thousandths
High Chrome Steel			
Hot Rolled	150	Hot Rolled Steel	.150"
Hot Rolled	250	Hot Rolled Steel	.250"
Cold Rolled	100	Cold Rolled Steel	.100"
Cold Rolled	200	Cold Rolled Steel	.200"
Tin Plate	50	Tin Plate	.050"
Non-Ferrous	65	Non-Ferrous Metals	.065"
Non-Ferrous	100	Non-Ferrous Metals	.100"
Special Alloy Steel			
Hot Rolled	100	Hot Rolled Steel (40 Carbon or under)	.100"
Cold Rolled	65	Cold Rolled Steel (40 Carbon or under)	.065"
Cold Rolled	150	Cold Rolled Steel (40 Carbon or under)	.150"
Non-Ferrous	100	Non-Ferrous Metals	.100"
Non-Ferrous	150	Non-Ferrous Metals	.150"
Non-Ferrous	200	Non-Ferrous Metals	.200"
Non-Ferrous	375	Non-Ferrous Metals	.375"
High Speed Steel			
Hot Rolled	20	Hot Rolled Steel (5% Silicon)	.020"
Hot Rolled	40	Hot Rolled Steel (2% Silicon)	.040"
Cold Rolled	20	Cold Rolled Steel (5% Silicon)	.020"
Cold Rolled	40	Cold Rolled Steel (2% Silicon)	.040"

EXAMPLE: If you are shearing 20 Carbon Cold Rolled steel, .125" thick, you should specify High Chrome 200 knives. Since your material is less than 40 Carbon, Special Alloy Cold Rolled 150 knives could be ordered but this type of knife will not stay sharp as long as High Chrome knives.



RED STREAK

FORGED ROTARY SHEAR KNIVES

Whether you're shearing hot or cold rolled steel, tin plate or non-ferrous metals . . . separately or in gang slitting operations . . . Simonds tailors a "Red Streak" Rotary Shear Knife specifically for your application. Made in 3 different Simonds own electric furnace steels, these job-engineered knives give you cleaner, higher quality slitting . . . and longer service between sharpenings.

Forged for maximum strength and resistance to wear, as well as to prevent nicking or breaking out under shearing pressure, "Red Streak" Shear Knives are precision ground to close tolerances and a low micro-inch surface finish.

These are all "reasons why" Simonds Shears give better results in the long run . . . why it will pay you to send for the free "Shear Selector Chart" and to place your next Shear Knife order with Simonds.

SIMONDS SAW AND STEEL CO.
FITCHBURG, MASS.

Factory Branches in Boston, Chicago, San Francisco and Portland, Oregon
Canadian Factory in Montreal, Que., Simonds Divisions: Simonds Steel Mill, Lockport, N. Y.
Simonds Abrasive Co., Phila., Pa., and Arvida, Que., Canada

AUTOMATIC DRILLING & TAPPING MACHINES

of the Transfer type provide maximum automation for multiple operations. Hartford Special's custom engineered features assure top efficiency and economy in high production. For the best buy in the long run consult Hartford Special — new, detailed bulletin available on request.

Other Hartford Special production equipment includes Automatic Thread Rollers and Super-Spacers, the world's finest indexing device.

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to

production...

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HARTFORD

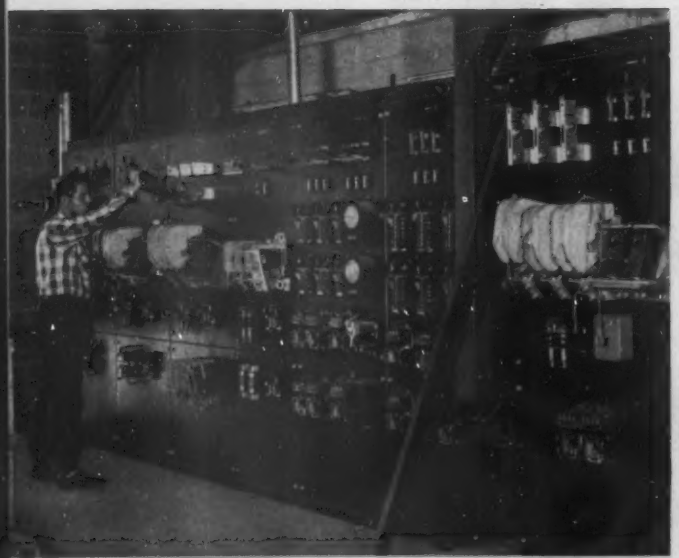
Special

THE HARTFORD SPECIAL MACHINERY CO.

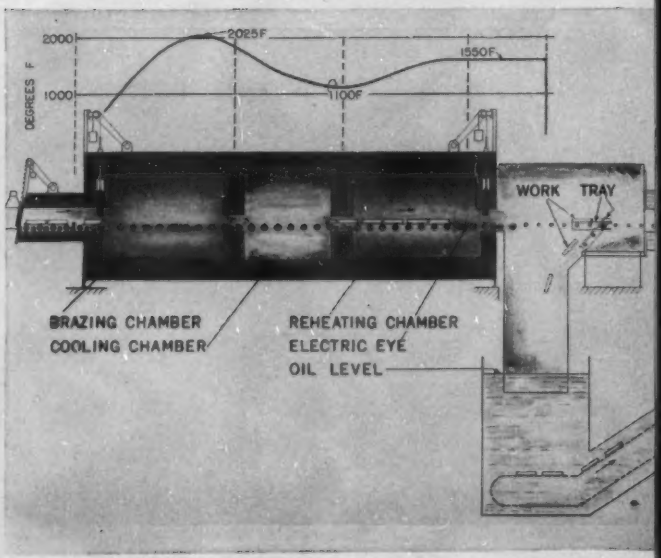
HARTFORD 12, CONN.

MANY OPERATIONS—including preheating, annealing, brazing, hardening, and tempering, with intermediate cooling and quenching—can be combined in one continuous pass through this type of combination G-E furnace. All intermediate handling is eliminated.

Production Increased Five Times



AUTOMATIC CONTROL AND TIMING of the complete heating cycle is provided by this G-E control panel. After heating pattern is set, panel supervision is not necessary, and uniform, high-quality heat treatment of parts is assured.



LONGITUDINAL SECTION VIEW of G-E roller-hearth furnace shows how assemblies pass through furnace during heat treatment. Straight-line heat treating like this simplifies furnace operation, and provides fast production and low handling costs.

with G-E "Combination" Furnaces

Burgess-Norton Combines Brazing And Hardening In One Furnace

"By combining brazing and heat treating of tank-track links in G-E roller-hearth, combination-type furnaces, we increased the production per furnace five times without adding any new personnel," reports Burgess-Norton Mfg. Co., Geneva, Ill.

In addition, this former user of batch-type, box furnaces has improved product quality, conserved production floor space, and substantially reduced costs by eliminating many handling operations.

Automatic operation of this G-E furnace reduces handling to merely loading and unloading the assemblies. No intermediate handling of work between brazing and heat treating is required because parts are brazed, partially cooled, reheated, and quenched for hardening in one continuous pass through the furnace.

Improved product quality and fewer rejects are assured because electric furnaces provide uniform heating of every part. Product inspection time is reduced because low-cost, G-E protective atmospheres prevent scaling. Parts emerge from the furnace bright and shiny requiring only a fast, visual examination.

You can reduce your over-all heating costs with these "combination" furnaces designed to meet the needs of a wide variety of metal-processing operations, including preheating, annealing, brazing, hardening, normalizing, or tempering. For more information, contact your nearest G-E Apparatus Sales representative.

GENERAL ELECTRIC

WRITE NOW FOR THESE MODERN METAL PROCESSING BULLETINS

• Furnace and Induction Brazing, GEA-5889 • Annealing Malleable Iron, GEA-5797 • Heat-treating Aluminum, GEA-5912

Address: General Electric Co., Sect. 720-119, Schenectady 5, N. Y.

Bay State 8A Vitrified Bonded Grinding Wheels

...Save 14%

Example: Basic† price of a premium-price "White" wheel 7" x ½" x 1¼" is $4.78.

Basic price of a BAY STATE 8A wheel of the same size is only $4.10.

SAVING IS $.68 ON A SINGLE WHEEL . . . or 14%!

What's more . . . these 8A wheels give you fast, free, cool cutting-action, plus minimum dressing and long life. This means MAXIMUM ECONOMY for your tool grinding operations . . . with "8A", those important first two symbols in the wheel specification.

Another part of this specification is important too! It's the "V2" symbol at the end, that means these economical wheels are available in BAY STATE'S EXCLUSIVE FRACTIONAL GRADES (Three separate degrees of hardness within a single normal grade). This lets you select exact wheels for each requirement.

These and many other BAY STATE innovations are the reasons for BAY STATE'S rapid rise to its position as a foremost supplier of quality abrasive products to American industry.

†*Basic prices are subject to discount.*

BAY STATE®
WHEELS of PROGRESS

Send for literature which includes listing of stock wheels with proven specifications.

Manufacturers of all types of Quality Abrasive Products

BAY STATE ABRASIVE PRODUCTS CO., Westboro, Mass., U. S. A.

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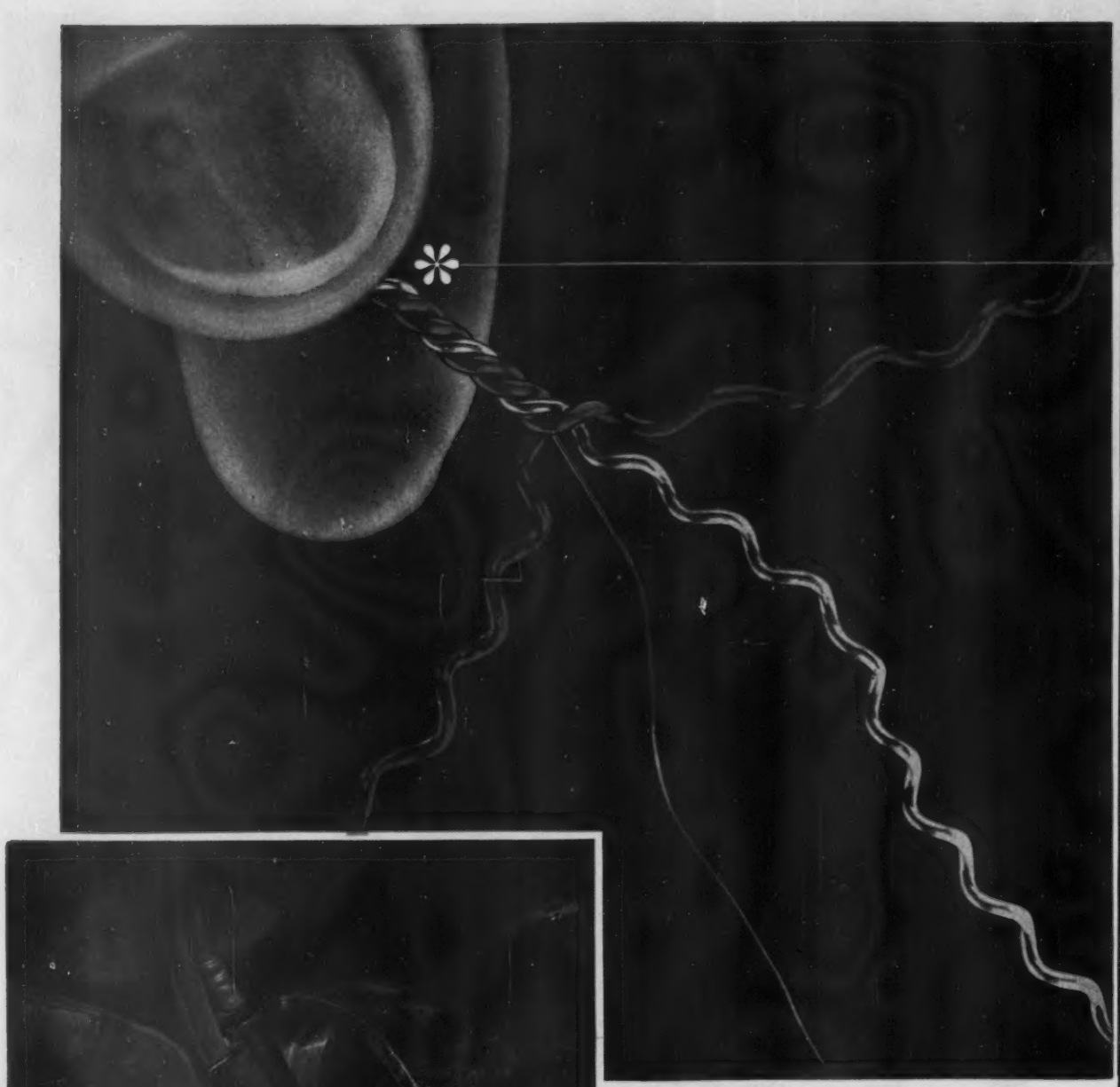
Distributors — All principal cities
In Canada: Bay State Abrasive Products Co. (Canada) Ltd., Brantford, Ont.



The problem of depositing special alloys that are hard to draw and spool for use with the Aircomatic process is neatly answered by the use of stranded wire, an Airco development. In the wire used for these aluminum-bronze overlays, two strands of copper and one of aluminum are wound around a fine iron core. Melted by the arc, the component metals mix and alloy themselves into aluminum bronze of the correct analysis.

An overlay ⅛" thick and 2" wide being deposited in the confined area of a 10"-diameter steel cylinder. Actual welding takes about twenty minutes.

AIRCO®

New Idea in Welding

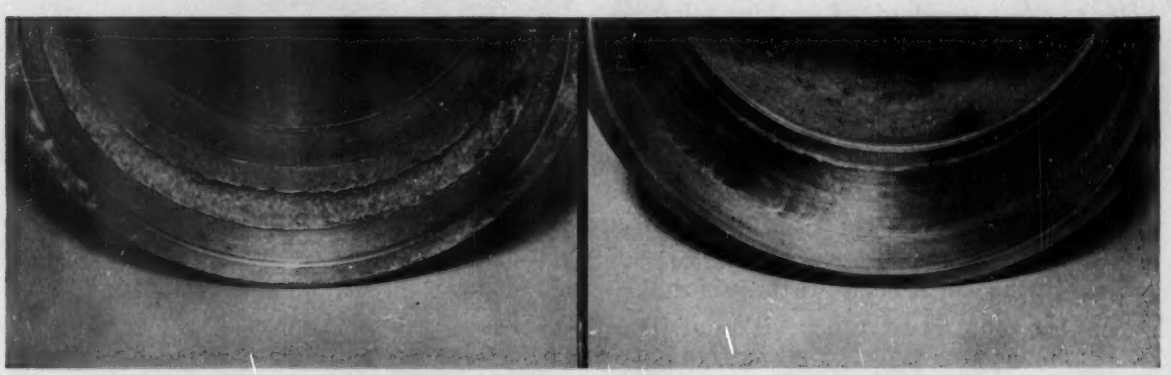
NEW STRAND-ALLOY "WIRE" DEVELOPED BY AIRCO OPENS WHOLE NEW FIELD OF APPLICATIONS FOR INERT-GAS-SHIELDED WELDING

Now, a completely new development, a stranded multi-metal filler wire, has opened the door to the welding of aluminum bronzes with the Aircomatic Process. This type of electrode is the answer where certain desirable compositions are impractical to draw down to small diameter wires and to coil on spools.

Manufacturers are using the new wire successfully, with remarkable increases in speed, ease and weld quality that Aircomatic has consistently shown in depositing more ductile materials. A typical report comes from National Rubber Machinery Company, Clifton, N. J. The National job involved aluminum-bronze overlays on piston recoil sleeves for tank guns. Before Airco introduced the new stranded wire, National Rubber Machinery had to use conventional "stick" electrodes. The new wire and Aircomatic welding cut production time to less than one-third what it was with the old method! Moreover, each sleeve took only 2½ pounds of wire, in contrast to six pounds of coated electrodes.

Airco now offers three types of stranded aluminum-bronze electrode wire, and one lead-tin-copper bearing alloy wire.

For details of this and other applications of Airco's amazingly fast and effective Aircomatic process, write your local Airco office today.



Close-up of the finished aluminum-bronze overlay before machining. Note the smooth beads and the absence of spatter.

After machining, the overlay looks like this. Aircomatic's concentrated heat input produces excellent fusion.

AT THE FRONTIERS OF PROGRESS YOU'LL FIND

AIR REDUCTION

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Air Reduction Sales Co. • Air Reduction Magnolia Co. • Air Reduction Pacific Co.
Represented Internationally by Airco Company International
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OFFICES AND DEALERS IN MOST PRINCIPAL CITIES

"Huskies" in a dog-sled hitch, still provide the most dependable transportation in the frozen north.

DEPENDABLE

Webster defines dependability as "the quality of being trustworthy"—and when we say Bath Taps are dependable, we mean you can trust them to produce threaded holes to exact standards of working tolerance.

Since our introduction of the "ground from the solid" process, Bath has eliminated distortion due to hardening. The steel blank is heat treated to the proper uniform structure before grinding. Controls maintain just the right degree of heat treating temperatures . . . then, all grinding operations are performed, assuring accuracy and complete dependability.

You can depend on Bath stock and custom taps to have refined cutting edges . . . exact thread form, lead and angle.

Another thing you can depend on at Bath, is our competent engineering staff . . . always ready to work on tap problems and help you meet your specific thread requirements. Once tap dimensions are determined . . . you can depend on exact duplication, every time you order. Try us and see!

Bath engineers check every detail, to see that all Bath Taps are conditioned to do the best threading job for your requirements.

Insist on BATH TAPS for BETTER THREADS

JOHN BATH & CO., Inc.

22 Grafton St., Worcester, Mass.

PLUG AND RING THREAD GAGES • GROUND THREAD TAPS • INTERNAL MICROMETERS

Ford Cuts Assembly Costs using

ROLLPIN TRADE MARK

*Rollpins applied as differential pinion pin lockpin on the Ford Motor Mound Road Plant assembly line.

Rollpin is the slotted tubular steel spring pin with chamfered ends. Simply drive it into holes drilled to normal production tolerances. It compresses as driven—and its spring action locks it in place regardless of impact loading, stress reversals or vibration.

Rollpin assembly eliminates extra operations and parts. There is no precision drilling, threading, peening—and no cotter pins or other locking devices. Cost savings as great as 90% result—depending upon the type of fastener replaced and the assembly method now in use. Our illustration is an air gun set-up that installs Rollpin at the rate of 8 units a minute on the Ford assembly line.*

Other insertion procedures range from simply driving Rollpin with a hammer to more intricate hopper-fed methods. Independent time studies have shown installed costs of Rollpin at *9%* of that for a dowel pin and *less than 5%* of the installed cost of a taper pin.

Mail our coupon for information on how Rollpin will do your fastening faster and cheaper.

ELASTIC STOP NUT CORPORATION OF AMERICA

Dept. R23-69, Elastic Stop Nut Corporation of America
2330 Vauxhall Road, Union, New Jersey

Please send the following free fastening information:

☐ Rollpin bulletin ☐ ELASTIC STOP® nut bulletin

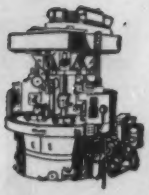
☐ Here is a drawing of our product.
What ESNA® fastener would you suggest?

Name_____ Title_____

Firm_____

Street_____

City_____ Zone____ State_____



BULLARD ACCURACY IN THE MAKING

WHEN there's *basic* precision machining to be done, the job becomes a "natural" for the SIP Jig Borer.

A typical example is this set-up in the Bullard Company's toolroom in Bridgeport, Conn. The job is the big Ring Plate Jig used for boring and tapping cone unit holes in carriers for Bullard Contin-U-Matics. The tool that does this precision machining is the SIP HYDROPTIC-6, an extremely sensitive combination precision measuring, drilling, boring and milling machine. It provides Bullard with a guaranteed setting accuracy of 0.0002" for both the work table and the spindle head. Its time-saving economy gives Bullard still another advantage: the operator quickly sets both coordinates by means of illuminated viewing screens – easily discernible to the naked eye at normal operating distances – which greatly magnify the images of the standard built-in table and saddle scales.

A drilling capacity of 2.375" in cast iron, a boring capacity of 12", and a 6" diameter milling cutter capacity attest to the wide range and versatility of the SIP HYDROPTIC-6. Our representative will gladly give you the whole story of SIP's priceless ingredient – *trustworthy precision for the toolroom as well as for production.*

An inquiry on your letterhead puts you under no obligation.

SIP

for precision

AMERICAN SIP CORPORATION

100 East 42nd Street, New York 17, N. Y.

In Canada address Rudel Machinery Company, Ltd., Montreal, Toronto, Windsor, Vancouver

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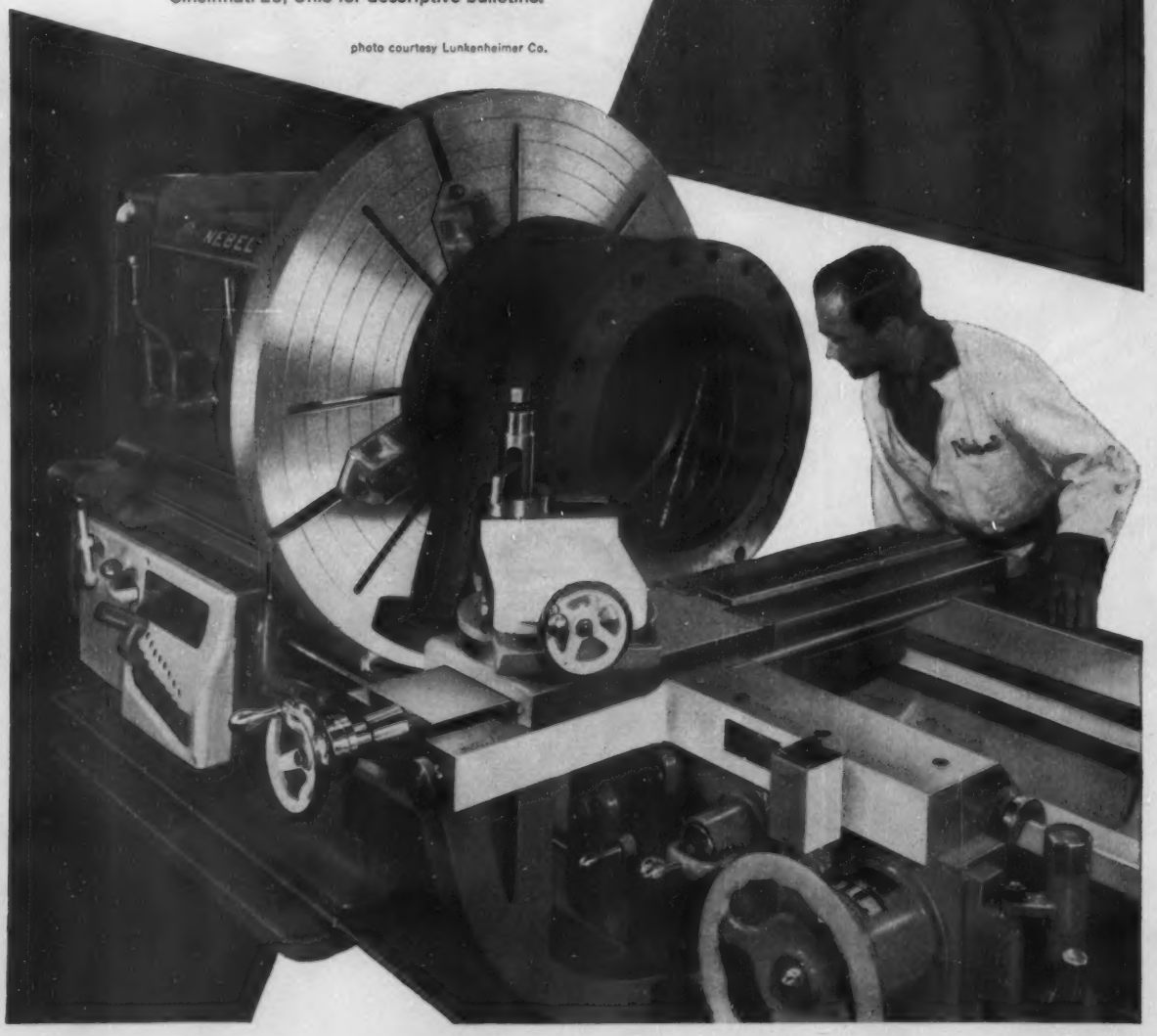
* Engine
* Removable block gap
* Extension bed gap

Nebel LATHES CINCINNATI

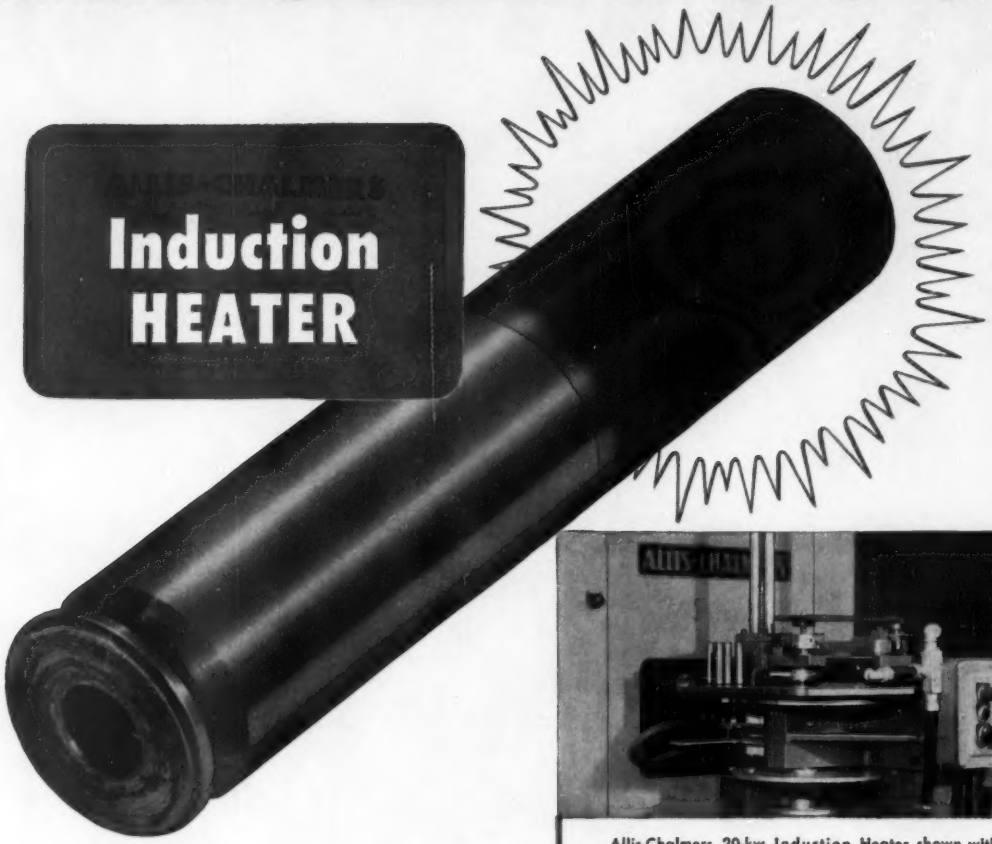
accurate
economical
big
fast
powerful
productive
versatile
big capacity
accurate

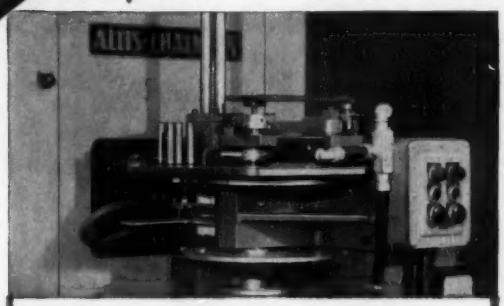
First, last and always Nebel lathes are accurate. They're Nebel designed, engineered, built and thoroughly tested to meet tomorrow's standards of accuracy today! We will proudly send you on request test sheets on current models to back up this statement. Nebel line includes engine, removable block gap and extension bed gap lathes, swing sizes 16" to 50". Write The Nebel Machine Tool Co., 3407 Central Parkway, Cincinnati 25, Ohio for descriptive bulletins.

photo courtesy Lunkenheimer Co.



Anneals 7000/hr





Allis-Chalmers 20-kw Induction Heater shown with A-C designed and built work-handling fixture.

...Steel Shell Cases...Almost 2 Per Second!

In pre-production tests, this Allis-Chalmers Induction Heater annealed steel shell cases at the amazing rate of 7000 per hour. Not only is this heating unit a fast worker, but it's a clean worker — and a cool one, too! It puts the heat into the metal where it belongs — holds down the ambient.

Get Expert Help

Whether your problem is annealing or hardening, brazing or soldering, find out what an Allis-Chalmers Induction Heater can do for you. You're sure to get increased production, or improved quality, or fewer rejects, or maybe all of these. Standard ratings up to 100-kw output are available. Call your nearby Allis-Chalmers District Office or write Allis-Chalmers, Milwaukee 1, Wisconsin.

Allis-Chalmers
Milwaukee 1, Wisconsin

I'm interested in:

- ☐ *brazing*
- ☐ *soldering*
- ☐ *annealing*
- ☐ *hardening*

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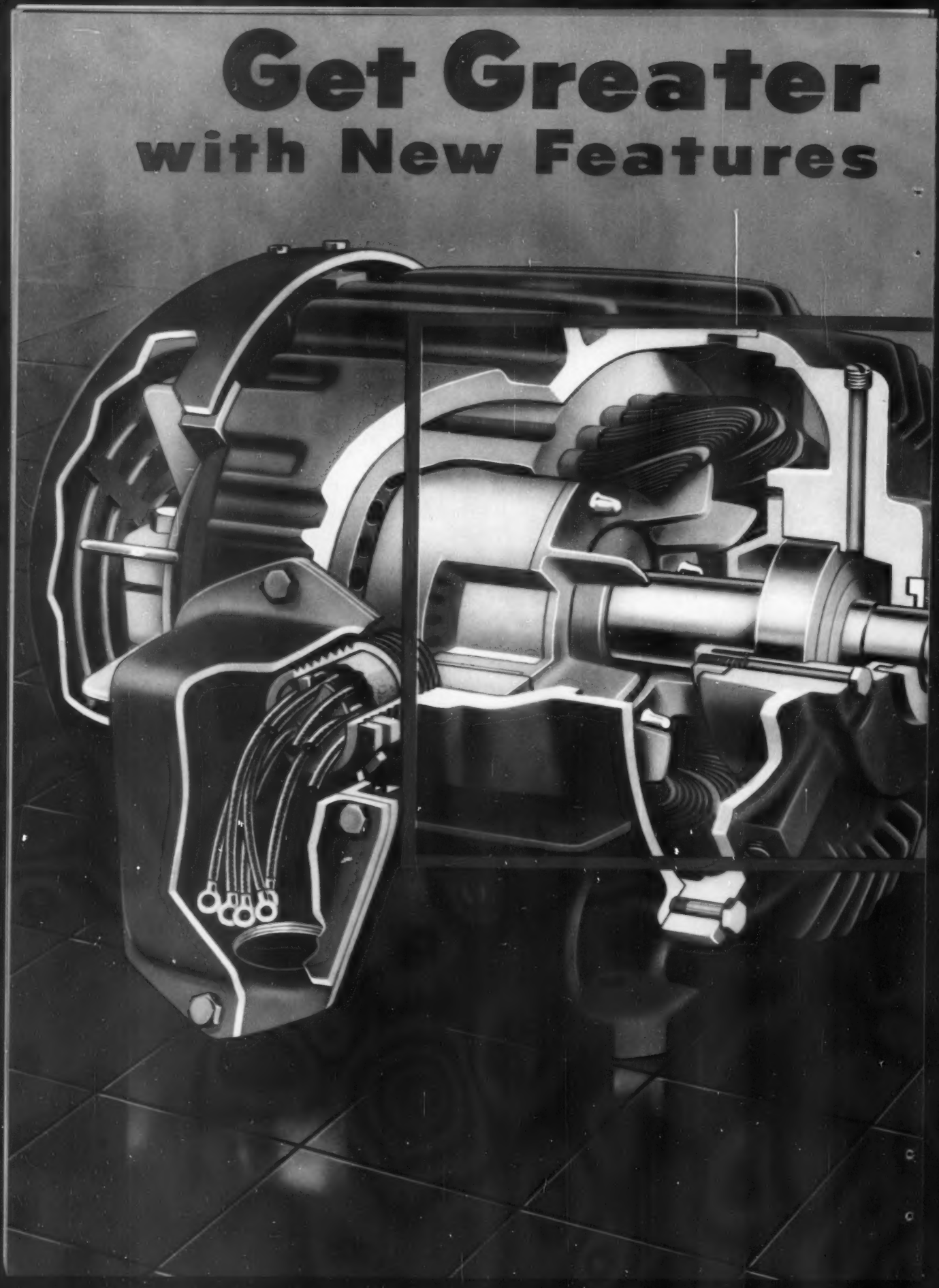
ALLIS-CHALMERS

Get Greater
with New Features

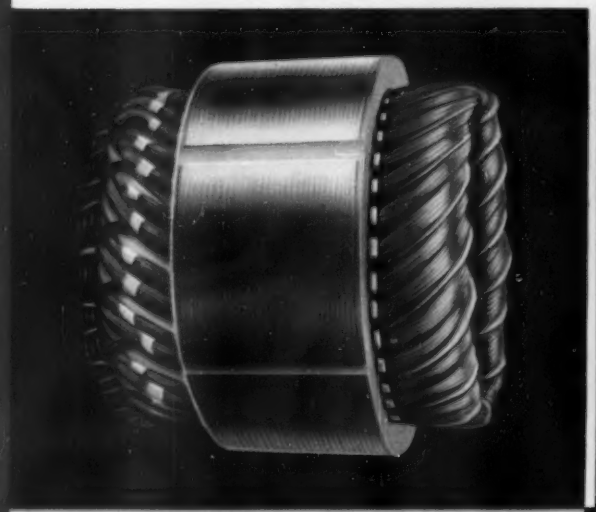


Motor Economy
. . . Proved Principles

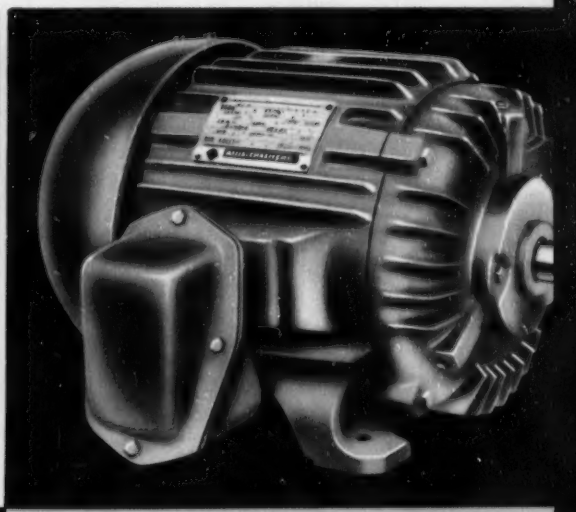
Here's the inside story of a great new motor. It combines the best of the new developments in methods and materials with the best of the tried and proved principles that have made such an outstanding record for Allis-Chalmers motors.

Smaller in size than previous design, it retains the easy-to-clean, fin-type construction which Allis-Chalmers pioneered several years ago. The bearing design gives greater bearing protection, ease of maintenance and long life. Insulation gives you famous Allis-Chalmers rugged dependability.

Consult your nearby Allis-Chalmers Authorized Distributor or District Office on your motor needs. Or write for Bulletin 51B6210.



STATOR DOUBLE INSULATED —Stator laminations are welded across back for rigidity. Heavy varnished cambric insulation is inserted between phase windings. Wound stator is dipped several times in special insulating varnish of proved effectiveness and stamina, and baked after each dip. The Allis-Chalmers stator is both physically and electrically strong . . . thoroughly protected against moisture, heat and corrosion.



FIN-TYPE CAST-IRON FRAME — Proved by years of service. Cooling ribs are cast integrally with the yoke; air is blown over them without restriction. There are no enclosed external air passages to clog up with dirt and thereby ruin cooling efficiency. Radiating surface provides reserve cooling capacity for extra strenuous duty. Cleaning, if required, is a few moments work with an air hose, brush or vacuum cleaner.

Multiple bearing protection keeps grease in... keeps dirt out...permits relubrication in service

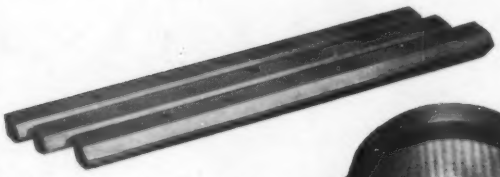
Extreme care has been taken to provide longest possible bearing life and lowest possible maintenance costs. The bearing itself is of double-shielded type, which allows controlled migration of grease in and out of the bearing to suit operating conditions. Yet bearing is protected against greatest cause of bearing trouble — overgreasing.

Close running clearances and double labyrinth seals between the shaft and outer bearing housings keep grease in the bearing and exclude dirt. Grease is kept out of the interior of the motor by a bearing cap with a long running clearance along the shaft. The cap is held tightly in place by hex head cap screws. Large grease chambers hold an ample supply of lubricant.

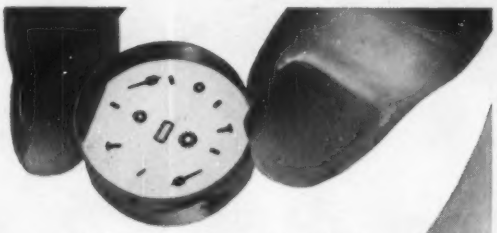
A-4363

ALLIS-CHALMERS

MILWAUKEE 1, WISCONSIN



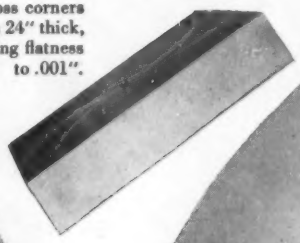
Hardened steel machine tool ways, 2½" x 3½" x 50", ground on 6 sides, flat within .001" with surface finish of 5 micro-inches—*5 times faster than other methods!*



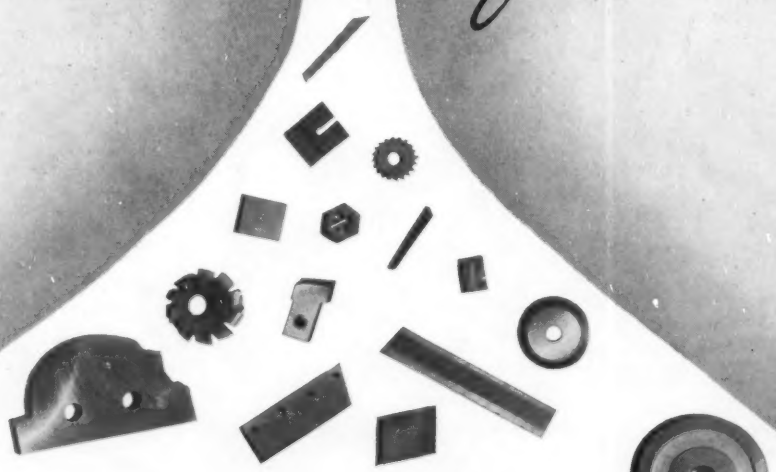
Tiny watch gears, pinions and ruby bearings—flat and parallel—to a dimension tolerance of .0002".

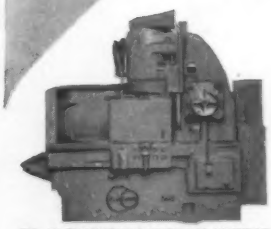
To 3 micro-inches and flat within *one* light band.

Die plates, 84" across corners and perhaps 24" thick, holding flatness to .001".



"Specs" like these call for Blanchard





NO. 18 BLANCHARD SURFACE GRINDER

Every day, parts like these are ground accurately and rapidly on Blanchard Surface Grinders equipped with Blanchard Abrasive Wheels. They're ground economically too—at costs which help you set competitive prices.

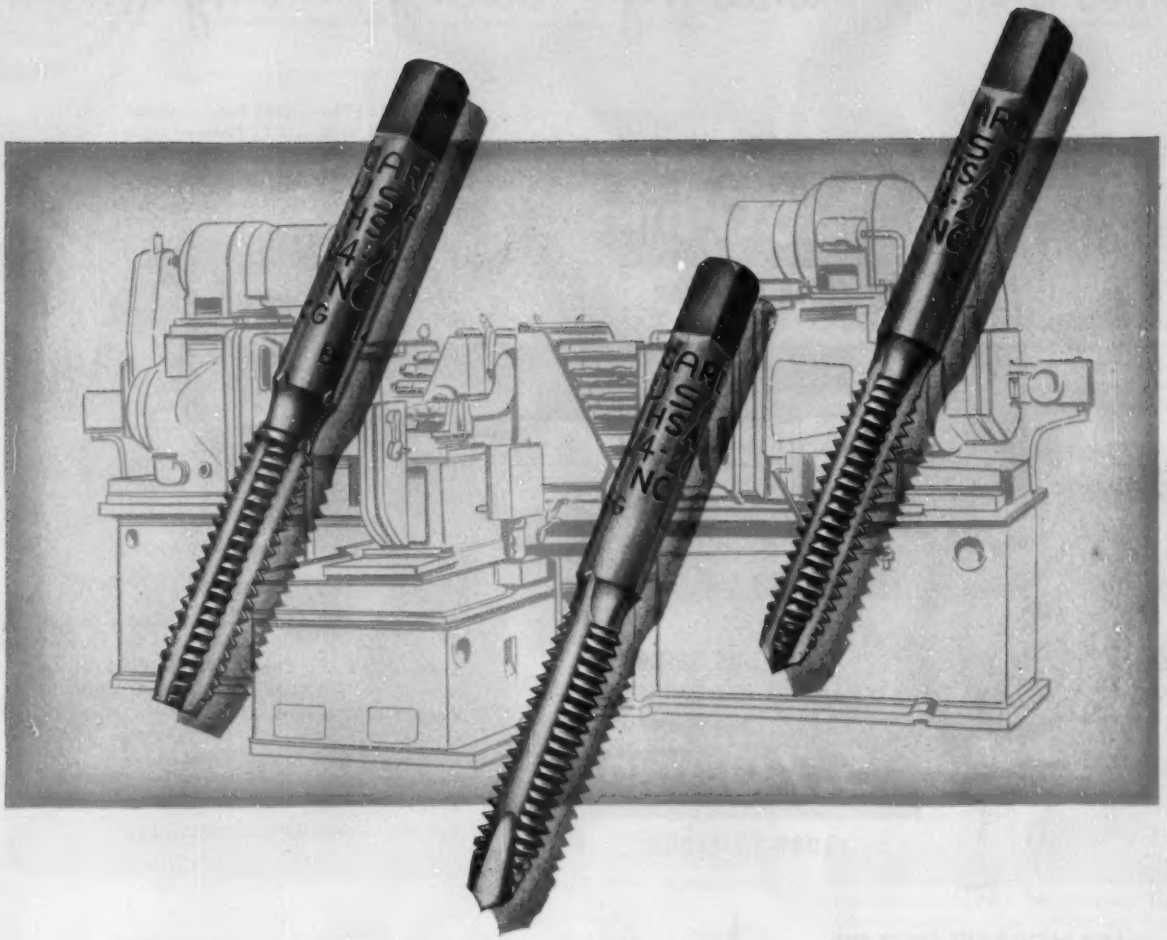
Send a sample of your parts for free test grinding and recommendations.

Send for your free copies of "Work Done on the Blanchard", fourth edition, and "The Art of Blanchard Surface Grinding".

PUT IT ON THE BLANCHARD

THE BLANCHARD MACHINE COMPANY

64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.



TAPS *by* CARD

In tapping steel, cast iron, aluminum alloys, bakelite, hard rubber or bronze, the excellence of the machine counts. But in the long run, maximum performance depends on the taps you use. With Card the quality is always assured.

The CARD Quality

Completely stocked offices at Atlanta, Chicago, Detroit, Fort Worth, Los Angeles, New York, San Francisco and Seattle

See your local Card distributor for prompt deliveries and helpful service

S. W. CARD MANUFACTURING CO., MANSFIELD, MASS. • DIVISION OF UNION TWIST DRILL CO. • **TAPS** • **DIES** • **SCREW PLATES**

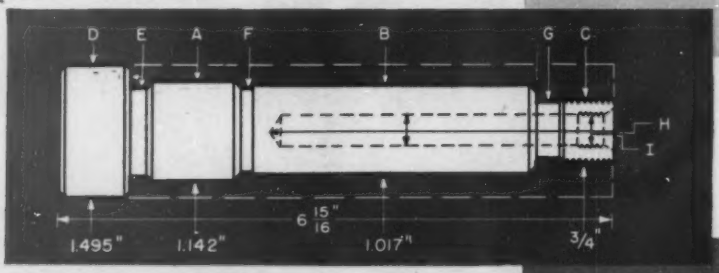
This is the difference High Velocity Turning makes

IN 1950 this job took...

7.60 min.

FLOOR TO FLOOR

Turn B 694 RPM — .005 Feed — Roller Turner
Turn C 694 RPM — .011 Feed — Square Turret
Turn A 694 RPM — .011 Feed — Square Turret
Turn D 694 RPM — .011 Feed — Square Turret
Form / Face } E.F.G. 694 RPM — Hand — Rear of cross slide
Chamfer — Square Turret
Drill H 694 RPM — .007 Feed
Tap I ⅛" NPT
Thread C ¾-16" Diehead
Cut Off 340 RPM — .0035 Feed — H.S.S.



IN 1954 this same job takes...

5.70 min.

FLOOR TO FLOOR

R. Turn A — 1500 RPM — .015 feed — Roller Turner
Turn, A.B.C.D., Chamfer — 1500 RPM — .015 Feed — Tracer Attachment
Face, Neck, E, F, G, — 1500 RPM — Hand — Square Turret
Drill H 694 RPM — .007 Feed
Tap I ⅛" NPT
Thread C ¾-16" Diehead
Cut Off — 1500 RPM — .0025 Feed

J & L LATHES CUT COSTS AND IMPROVE QUALITY BY GIVING

MORE Ease of Operation
MORE Power Transmission
MORE Rigidity
MORE Accurate Stops
MORE Efficient Lubrication
MORE Coolant on Cutting Tools
MORE Accurate Results

Turning out a medium-run job such as this in 5.70 min. calls for a lathe with plenty of power and the beef to back it up, plus the addition of another Jones & Lamson innovation — the turret lathe tracing attachment.

With this attachment, many complex machining operations can be made in a single set-up, with less down time between jobs. Only with a lathe like this can your shop take full advantage of the quality, productivity and lowered costs offered by High Velocity Turning.

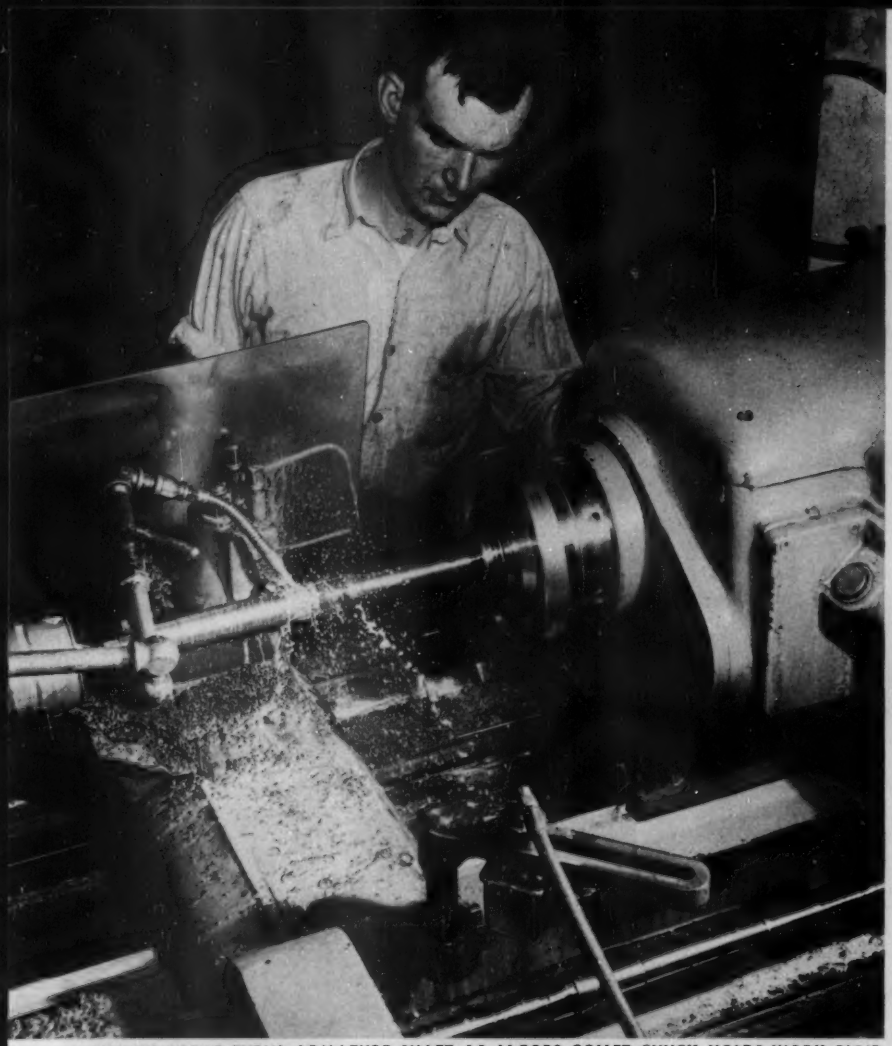
Jobs like this are turned daily on our production line. Come to Springfield and see for yourself.
Send for catalogs #101-A and #102.

JONES & LAMSON

Machine Tool Craftsmen Since 1835

JONES & LAMSON MACHINE CO., 502 Clinton St., Dept. 710, Springfield, Vt., U.S.A.

J&L MACHINE TOOL DIV.



TRACER LATHE TURNS ARMATURE SHAFT AS JACOBS COLLET CHUCK HOLDS WORK RIGID.

SHAFT IS INSERTED AT AN ANGLE by Walter B. Best, operator. This is allowed by the flexibility of the collet and greatly reduces tailstock resetting adjustment.

COLLET GETS IMPACT TIGHTENING. Handwheel hammer lugs deliver an impact blow on impact sleeve inside handwheel. Force exerted is several times greater than in ordinary hand tightening.

JACOBS SPINDLE NOSE LATHE CHUCK permits use of maximum speeds and feeds on modern tool room lathes. Chucks any bar between 1/16" and 1 3/16". The world's finest collet chuck.

COLLET PERFORMS GRIPPING FEAT

Rubber-Flex Collet jaws close down on work with parallel bearing that defies slippage

International Equipment Company in Brighton, Massachusetts has high praise for a unique collet it uses. The collet daily delivers the tightest, most accurate grip ever devised in lathe collet equipment — 2 to 4 times the gripping power of split steel collets.

This Jacobs Rubber-Flex Collet, the heart of the Jacobs Spindle Nose Lathe Collet Chuck, provides an absolutely parallel grip over the entire bearing surface. Its multiple, long steel jaws are locked together with oil resistant synthetic rubber and offer a length of bearing that is 50–75% greater than can be obtained in split steel collets.

The full 1/8" range of the collet permits chucking bars with variable outside diameters.

"Eleven of these collets have the gripping range of eighty-eight split steel collets," points out Evan Anderson, Assistant Foreman, Maintenance Division.

The collet's radically different construction is considered, by tool engineers, one of the most outstanding developments in modern tool history. Jacobs Spindle Nose Lathe Chucks, known all over the world, are stocked and sold by your Industrial Supply Distributor. The Jacobs Manufacturing Company, West Hartford 10, Connecticut.

IF IT'S A

JACOBS

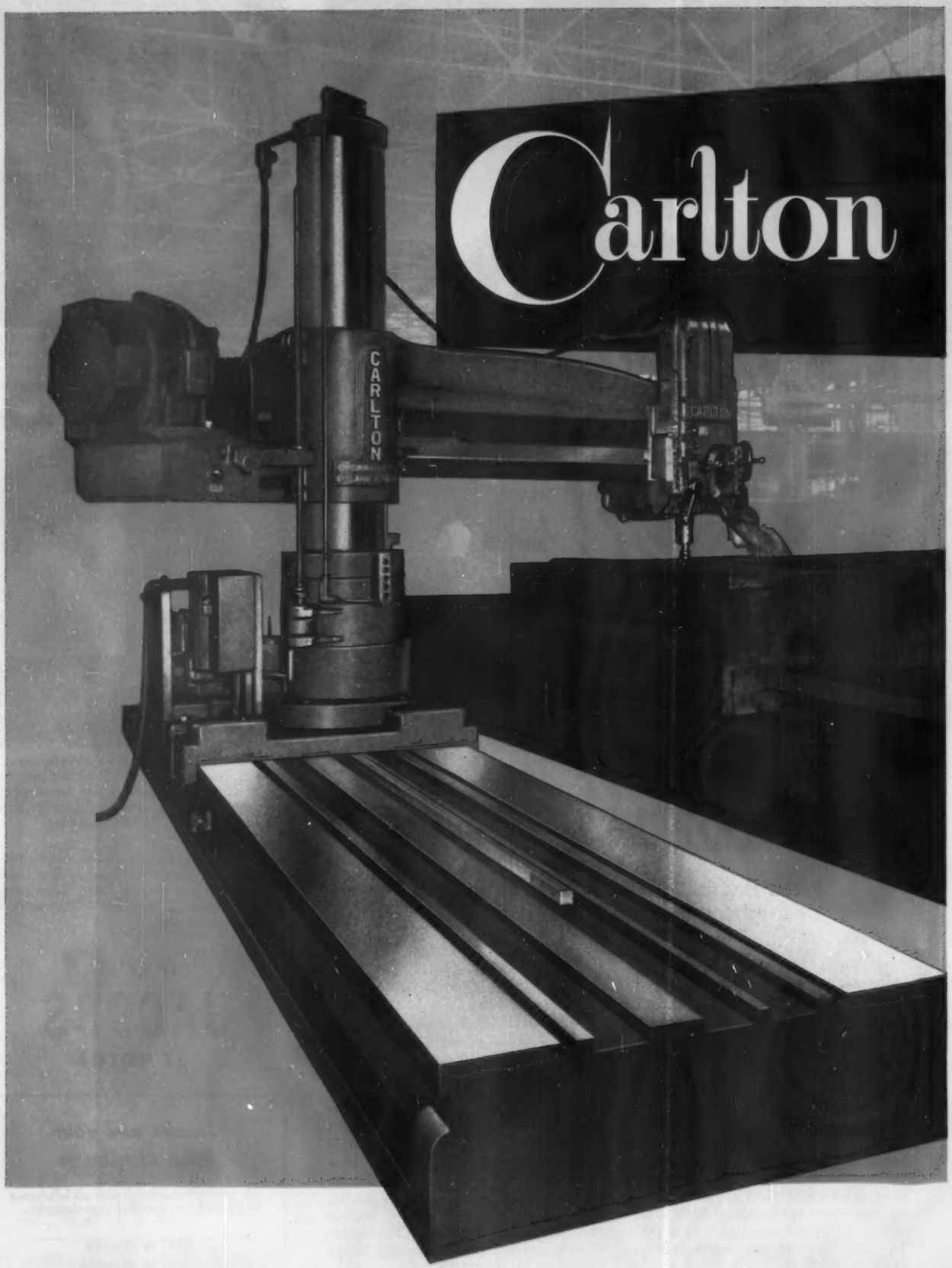
IT HOLDS

Jacobs and your local distributor

are ready to deliver the chucks you need and the service you deserve.

. . . first in chucks

. . . first in service


Carlton
CARLTON

puts you on the track to real hole drilling efficiency!

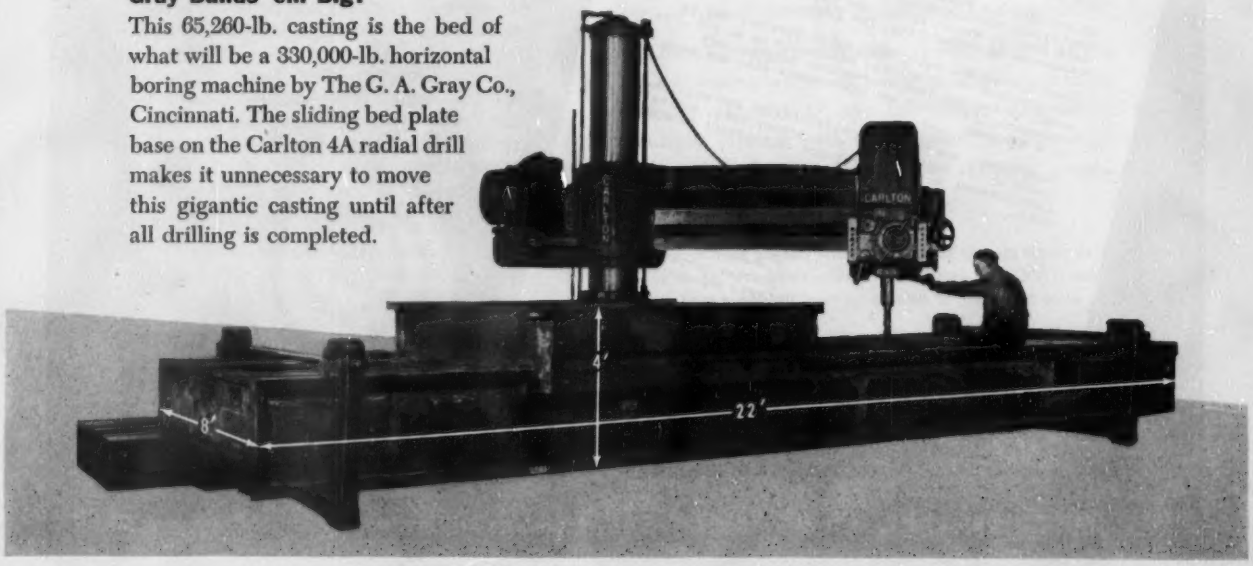
Carlton "gets around." Yes, thanks to its special sliding bed plate base, this Carlton 4A radial drill moves the entire length of this 22-ft long G. A. Gray Co. casting. At one setting it drills the required 75 levelling screw holes without the necessity of lifting so much as an ounce of its 33 tons.

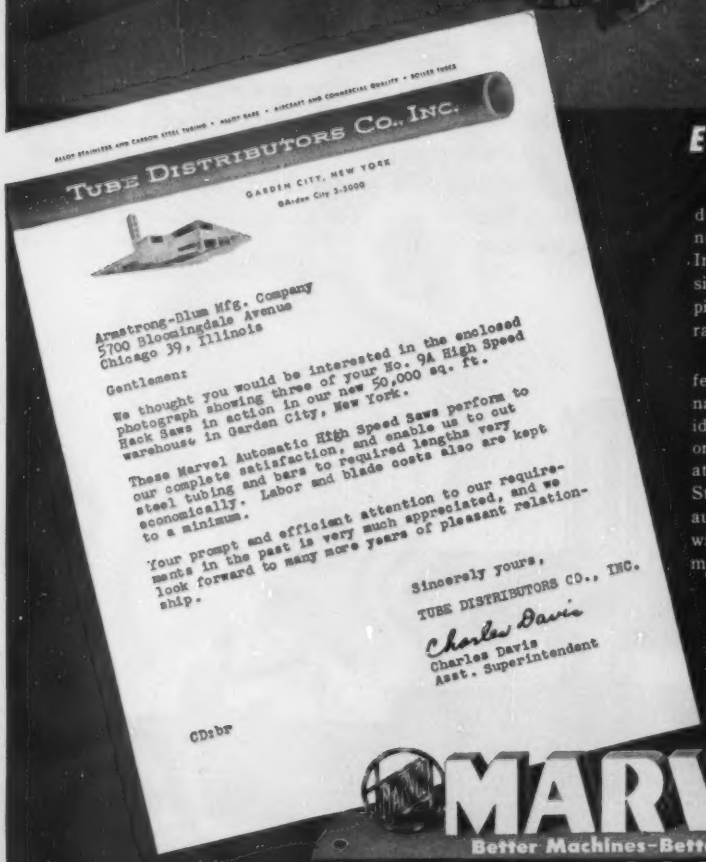
Think what this special Carlton mounting saves in terms of time, energy and expense in drilling this one casting alone! And yet this is but one of many Carlton engineering achievements planned for you . . . to bring you maximum hole drilling efficiency.

Carlton offers seven other types of mountings, plus a variety of plain or uni-tile tables and revolving jigs. And there's an equally wide choice in the Carlton radial drills themselves, too: many different models with arm lengths from 3-ft to 12-ft, column diameters from 9" to 26".

Carlton engineers will be glad to work with your engineers in laying out the most efficient radial drill set-up for your requirements. For maximum hole drilling precision and production today and tomorrow, check Carlton now. The Carlton Machine Tool Co., Cincinnati 25, Ohio.

Gray Builds 'em Big!
This 65,260-lb. casting is the bed of what will be a 330,000-lb. horizontal boring machine by The G. A. Gray Co., Cincinnati. The sliding bed plate base on the Carlton 4A radial drill makes it unnecessary to move this gigantic casting until after all drilling is completed.




TUBE DISTRIBUTORS CO., INC.
GARDEN CITY, NEW YORK
GArden City 3-3000
Armstrong-Blum Mfg. Company
5700 Bloomingdale Avenue
Chicago 39, Illinois
Gentlemen:
We thought you would be interested in the enclosed photograph showing three of your No. 9A High Speed Hack Saws in action in our new 50,000 sq. ft. warehouse in Garden City, New York.
These Marvel Automatic High Speed Saws perform to our complete satisfaction, and enable us to cut steel tubing and bars to required lengths very economically. Labor and blade costs also are kept to a minimum.
Your prompt and efficient attention to our requirements in the past is very much appreciated, and we look forward to many more years of pleasant relationship.
Sincerely yours,
TUBE DISTRIBUTORS CO., INC.
Charles Davis
Charles Davis
Asst. Superintendent
CD:br

EQUIPPED FOR SERVICE

With the three No. 9A Marvel Heavy-duty Production Saws shown above in their new warehouse, the Tube Distributors Co., Inc. are equipped to give prompt service on single lengths or any quantities of identical pieces for these are the world's fastest, accurate cutting-off machines.

Operating at higher speeds and heavier feeds with blades tensioned tauter than ordinary saws, these saws will cut off accurately identical lengths from single or nested tubes or bars automatically—with no more operator attention than an automatic screw machine. Still, at any point in a "production run", the automatic bar-push-up can be disengaged with the throw of a lever, a miscellaneous cut made, and the "production run" resumed.

Write for Marvel Catalog
9 types of metal-cutting saws,
capacities 4" x 4" to 24" x 24".

Metal Cutting
MARVEL SAWS
Better Machines—Better Blades

ARMSTRONG-BLUM MFG. CO. *5700 Bloomingdale Avenue • Chicago 39, Illinois*

how the Aircraft Industry gets better threaded studs...

with NATIONAL ACME "FETTE" self-opening thread rolling heads

rolls threads

FASTER

SMOOTHER

STRONGER

CHEAPER

than any other tool

Precision is a must in the aircraft industry and the threading of studs is no exception. Here, thread specifications call for close tolerances and fine finish in materials that are tough to work with—stainless, high alloy and heat treated studs.

Rolled threads meet the requirements and National Acme "Fette" heads roll 'em at lower cost —save investment in second operation machines and often avoid rehandling because the heads can be applied to primary machining equipment.

These heads generate the thread ahead of the rolls insuring a flow of metal to full thread form without cratering at the crest—smoother, stronger threads with a burnished surface. And rolling speeds are the same as turning speeds with high speed tools.

Bulletin FRH-53 shows specifications of the six head sizes —1/16 to 3/4" in non-revolving type head, 7/16 to 1" revolving type—or, ask your engineers to talk with ours.

The NATIONAL ACME COMPANY

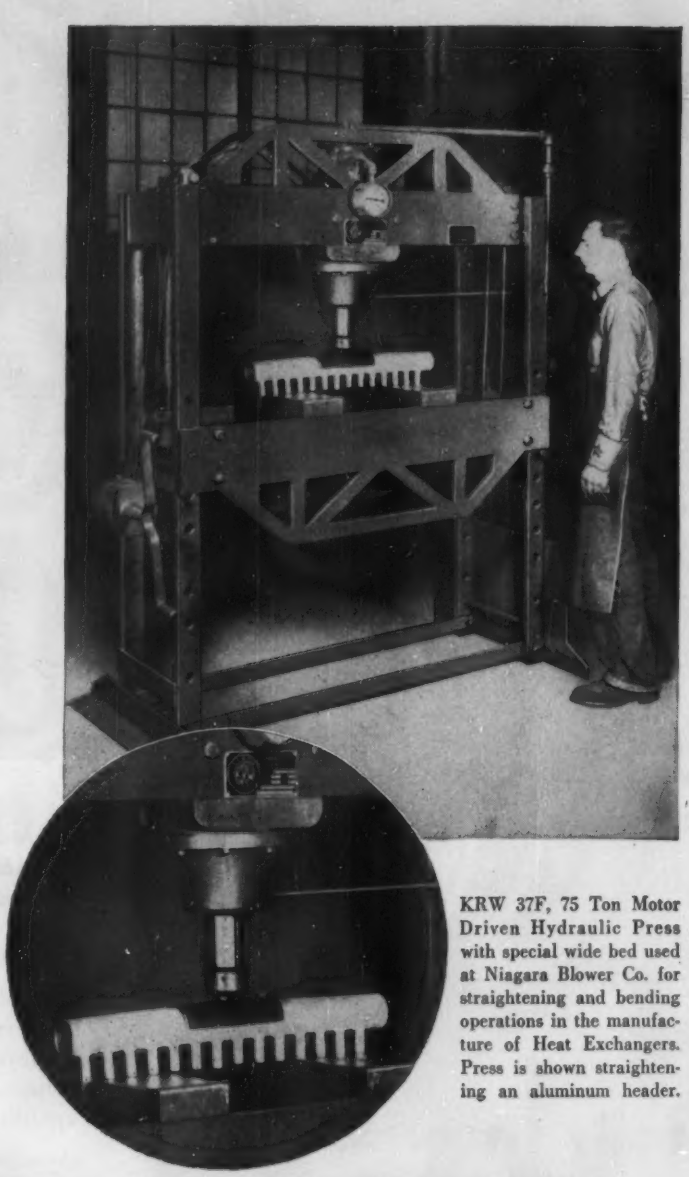
170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • Limit, Motor Starter and Control Station Switches • Solenoids • Contract Manufacturing

Another KRW HYDRAULIC PRESS living up to it's reputation!

Like most metalworking plants, Niagara Blower Co. has a number of straightening problems in their operations — pieces that warp or bend out of shape after punching or welding. And Niagara solves these problems with this KRW motor-driven hydraulic press. It is used for straightening headers, header ends, bar irons, and other components of the company's line of heat exchangers. Niagara officials tell us that this KRW Press has really lived up to its reputation for speed, accuracy and versatility. They especially like two features of their KRW Press: the ease and accuracy with which the ram can be inched down to the work and the speed with which it converts from one set-up to another.

Let KRW help with your pressing problems. We make a full line of one, two and three cylinder Hydraulic Presses; 25-150 ton capacities; hand, air or motor-driven. Check with your Machinery dealer or write us for literature and prices.



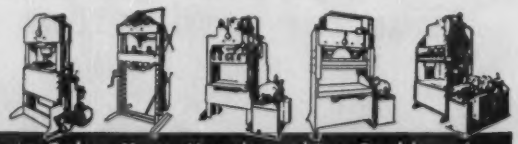
KRW 37F, 75 Ton Motor Driven Hydraulic Press with special wide bed used at Niagara Blower Co. for straightening and bending operations in the manufacture of Heat Exchangers. Press is shown straightening an aluminum header.

ONLY KRW GIVES YOU ALL THESE FEATURES:

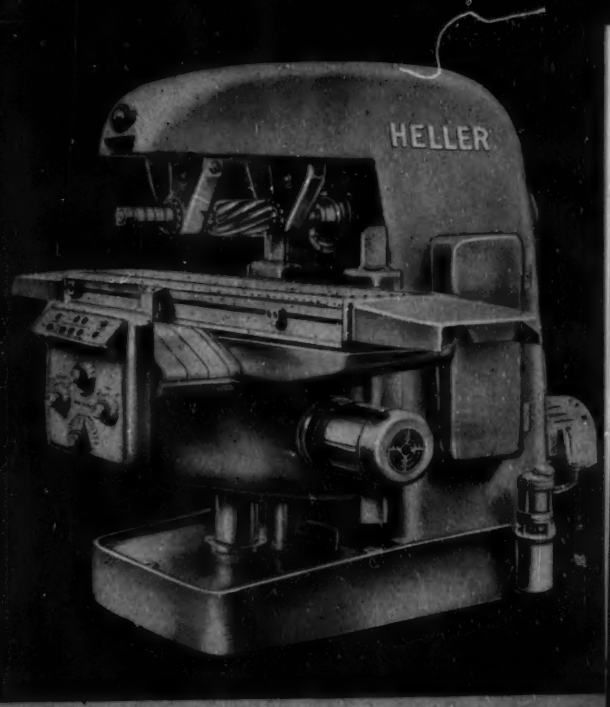
- **Heavy Construction Throughout.** Bed and Crown Members Truss Reinforced for Added Stiffness and Strength. A KRW Exclusive Feature.
- **Any Tonnage Pressure** up to Rated Capacity can be Obtained Quickly and Selected Pressure Locked for Repetitive Operations.
- **One Swinging Ball Arm** Controls Motion of Ram Downward, Holds Pressure on Work, or Returns Ram.
- **Excellent "Inching" of Ram** Because Motor Runs Only When Operator Moves Ball Arm for Downward Ram Travel.
- **Spring Return of Ram** Gives Maximum Speed on Up-Stroke.
- **Highest Quality** Radial Type Hydraulic Pump.
- **Direct Connected Motor Drive** Through Flexible Coupling.
- **Two Speed Hand Pump** also Furnished on Motor Driven Presses in this series.

K·R·WILSON

210 Mill Street, Arcade, N. Y.



Designers and Builders of the Right Hydraulic Press to Solve Your Metal-working Problems!



Cut Costs and Increase Efficiency with

HELLER

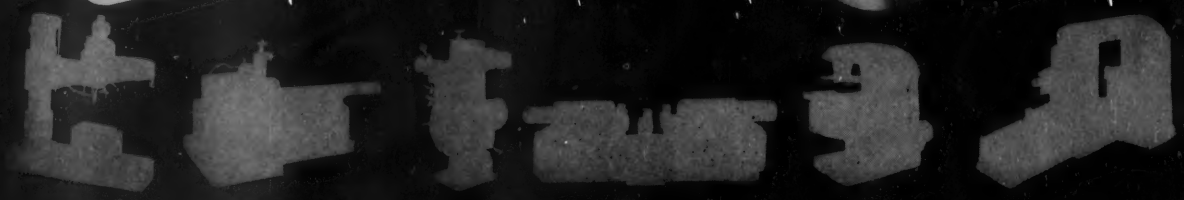
PRODUCTION MILLING MACHINES

HELLER knee type milling machines are available in either horizontal or vertical construction for use with carbide cutters for heavy milling work.

They are rigidly built for the heaviest production milling with powerful drive units with 18 speeds to a roller bearinged spindle.

The control is through push button selection and machines can be furnished standard or equipped with full automatic cycling control or with copy milling control through electro-hydraulic feeler.

Importing Heller Machines Since 1926

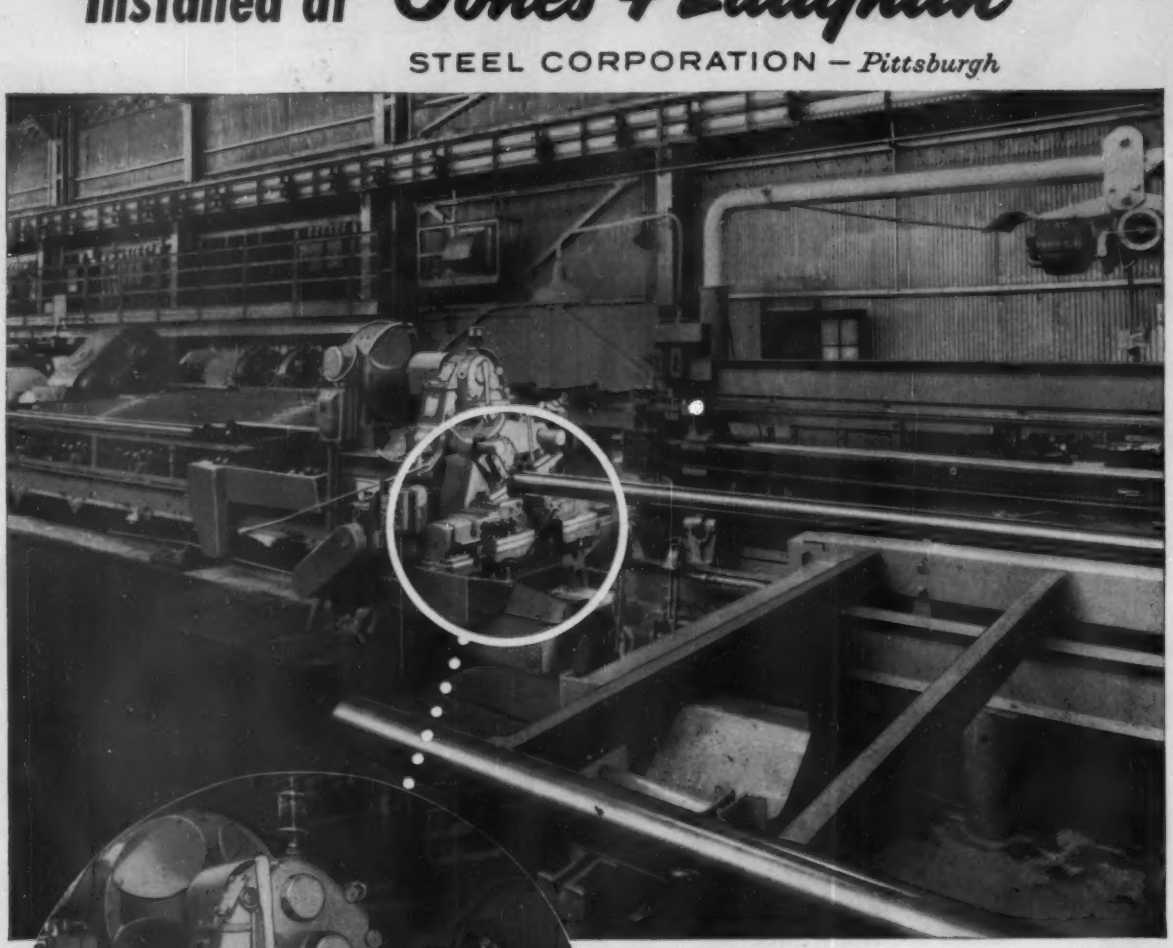


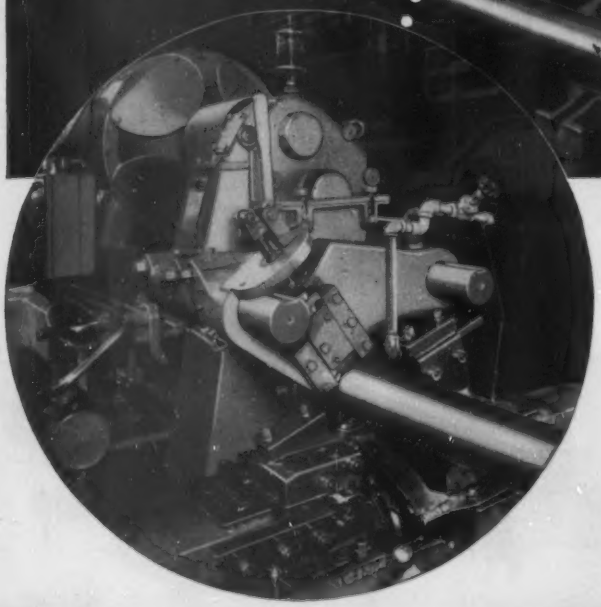
DRILLING MACHINES | COLD SAWING MACHINES | SAW SHARPENING MACHINES | TRANSFER AND SPECIAL MACHINES | KNEE TYPE MILLING MACHINES | PLANER TYPE MILLING MACHINES

HELLER MACHINE CO., 114 Liberty St., New York 6, N. Y.

New BARDONS & OLIVER Cutting-Off Lathe Installed at *Jones & Laughlin*

STEEL CORPORATION — *Pittsburgh*





Photographs courtesy of Jones & Laughlin Steel Corp.

The Bardons & Oliver Cutting-Off Lathe recently installed at Jones & Laughlin, Pittsburgh Works Division, has automatic LOADING and UNLOADING tables to completely eliminate manual handling of stock. Material being cut is 6" *SOLID BAR STOCK*, ground and polished. Close up view shows the Bardons & Oliver rugged, dependable double tool slides, which reduce the time of cutting-off by close to 50%.

Bardons & Oliver Rotating Type Cutting-Off Lathes are standard equipment in most of the Nation's leading pipe and tube mills. They are available in capacities from 2" dia. to 16" dia. Write today for literature on your particular cutting-off requirements.

BARDONS & OLIVER, INC.

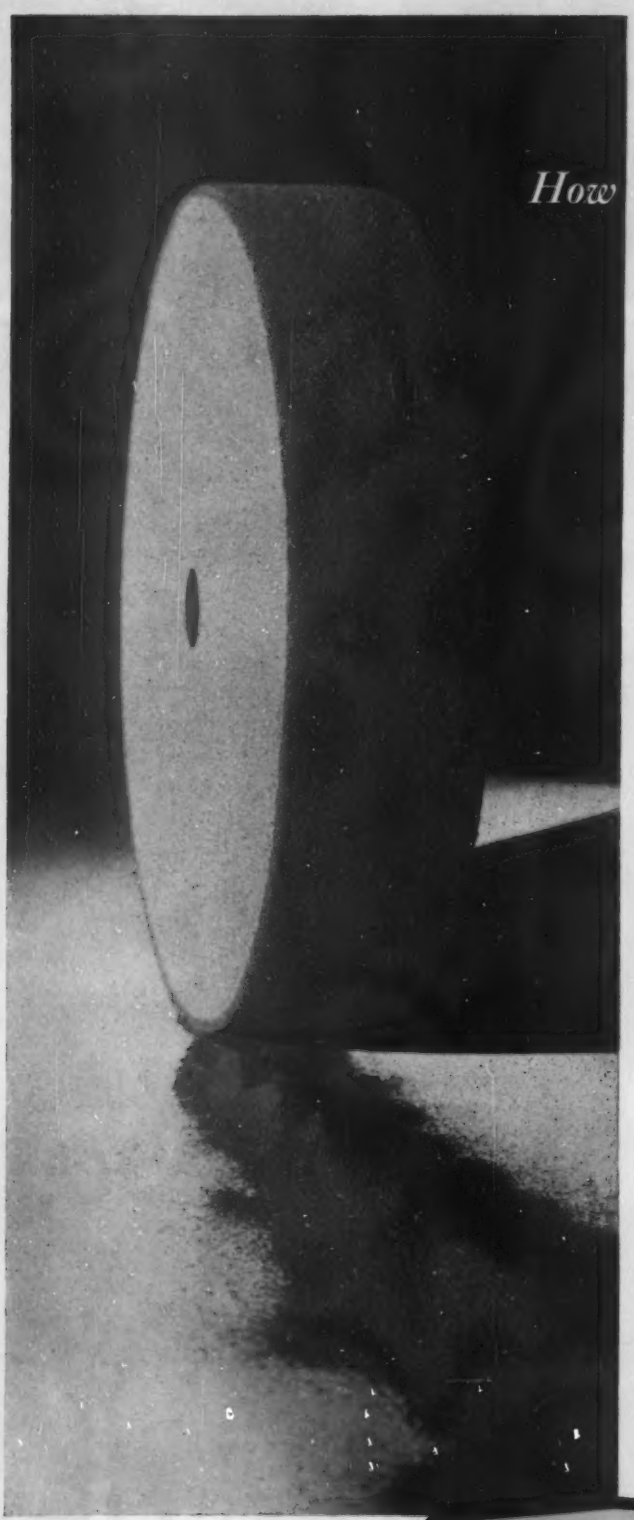
1134 WEST 9TH STREET • CLEVELAND 13, OHIO

National Tool Co.

Years of successful experience in special tooling and related production problems are yours for the asking. When the job requires special cutting tools call in your National Tool Co. representative. He is backed by more than 49 years experience in the engineering and manufacture of special cutting tools. His assistance is yours, without obligation, whether you're interested in one tool or a complete tooling program.

National Tools Cleveland

National
TOOL CO.
Cleveland 2, Ohio



How ALUNDUM grain adds the profit-boosting*
"TOUCH of GOLD"
to all your polishing wheel operations

When setting up your metal polishing wheels or belts, remember these advantages of Norton ALUNDUM abrasive grain:

- It is extremely hard, tough and sharp.
- It is uniform in chemical composition, crystal structure and grain size — no oversize grains to mar the surface, no undersize grains to loaf on the job.
- Its high capillarity, produced by special Norton processing, means easier wetting with the glue and assures stronger, faster cutting, longer lasting wheel heads.
- *And you can get* ALUNDUM *grain in exactly the grain shapes and surface treatments you need to add the product-improving, money-saving "Touch of Gold" to every step of polishing, with every type of wheel and on every metal.*

Watch your setting up temperatures!

Cold wheels and cold abrasive grain jell the hot glue too rapidly, which reduces its adhesiveness and prevents sufficient pickup of grain, resulting in slow cutting, hot running wheel heads. To guard against this, pre-heat wheels and grain to between 100° and 120°F, so the glue solution can be applied at a temperature of 140°F. Also, hold the setting up room temperature around 80°F, use uniform pressure when rolling wheels in the grain trough, and make the whole procedure as fast as possible.

Further helpful information

on every factor in the setting up process — including the selection of ALUNDUM grain, preparation of glue, use of cement, drying operations, wheel types, polishing different metals, etc. — is contained in the Norton booklet *Setting Up Metal Polishing Wheels and Belts.* Your Norton Distributor can supply it, and can make quick deliveries of ALUNDUM grain from complete stocks in key cities. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed under "Grinding Wheels" in your classified phone directory. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Massachusetts. G-275

Making better products... to make other products better

NORTON

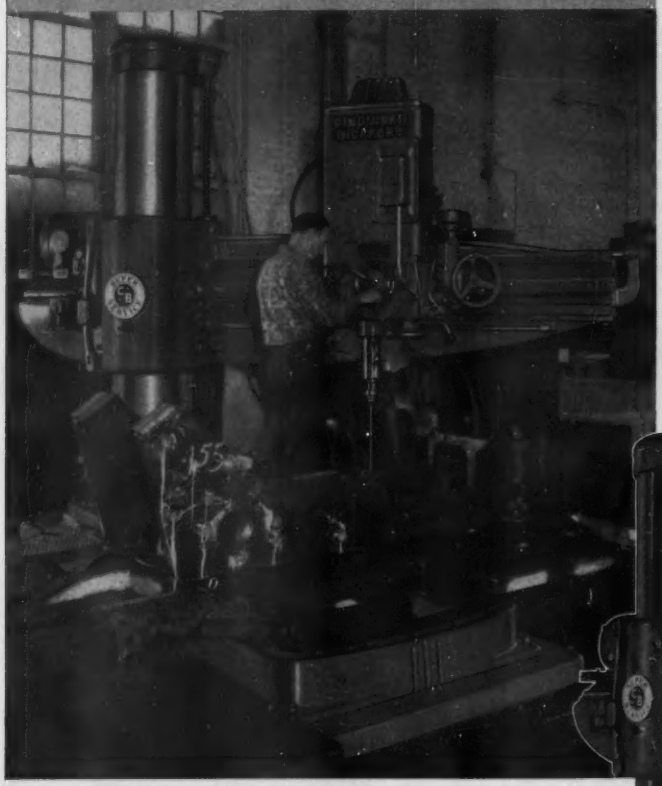
and its **BEHR-MANNING** *division*

NORTON: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

"top performers"

AETNA-STANDARD ENGINEERING CO.
ELLWOOD CITY, PA.

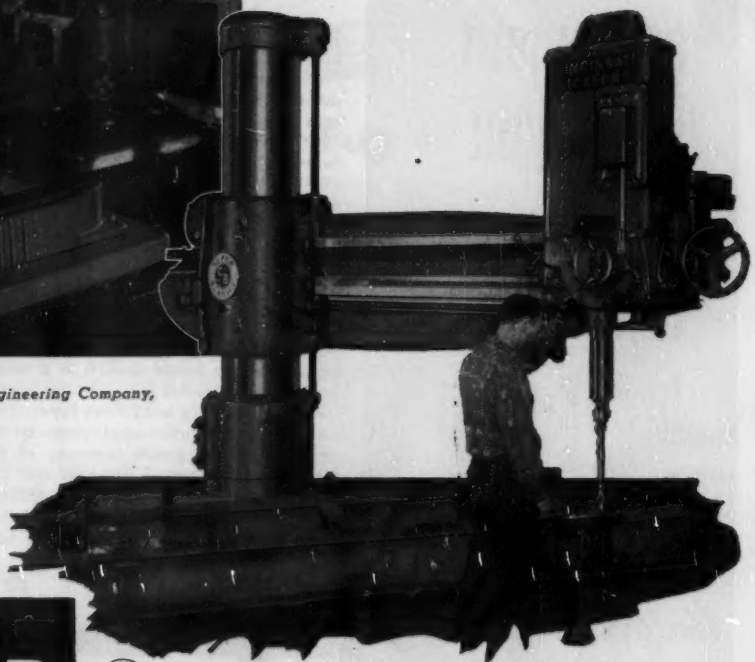


The Aetna - Standard Engineering Company say—"It is our opinion on radial drills that Cincinnati Bickford Super Service Radial Drills are top performers from the standpoint of service and handling ease".

Illustrations show the top carriage of gun carriage being drilled, tapped and reamed complete on this Cincinnati Bickford Super Service Radial—holes from ¼" to 1¼", limits within .0005".

Write for Booklet R-29.

Photos courtesy of the Aetna-Standard Engineering Company, Ellwood City, Pa.



CINCINNATI
BICKFORD

RADIAL AND UPRIGHT DRILLING MACHINES

THE CINCINNATI BICKFORD TOOL CO.
Cincinnati 9, Ohio, U.S.A.

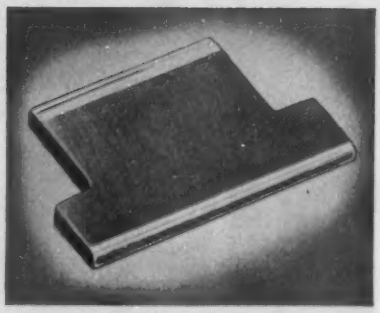
Why wait?
CUT YOUR COSTS NOW!

let the leading manufacturer of broaching equipment show you how to lower your break-even costs.

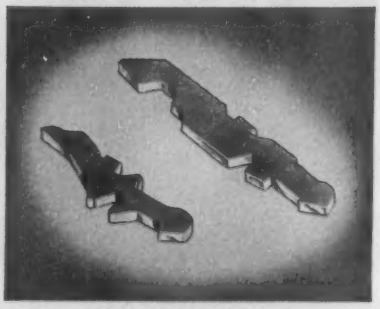
Unified Broaching

COLONIAL

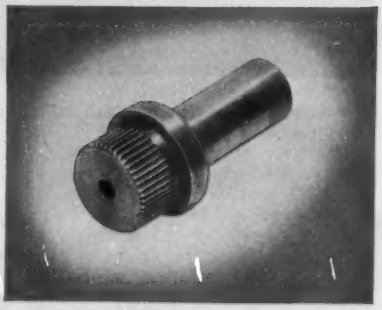
TEN TIMES FASTER than previous methods—broaching top and bottom radii on these automatic transmission reverse band anchors is helping one manufacturer lower the break-even costs. The design called for both edges to be rounded with a taper leading into one of the rounded edges. Besides increasing production by 10 times, the broached surfaces are more accurate, and costs are kept to a minimum. Thousands of these band anchors are being machined between broach sharpenings.

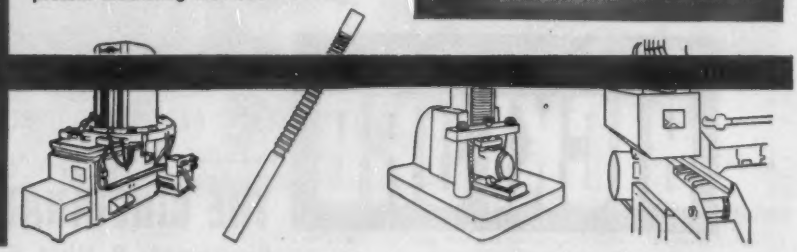


THIRTY TIMES FASTER than milling—broaching lowers costs in the production of the intricate shapes of these copper breaker points. Seven pieces at a time are broached at a rate 30 times faster than by milling. 75,000 pieces are completed before it is necessary to sharpen the broach. 800 to 1000 pieces per hour are broached on one Colonial machine with only two sets of Colonial broaches.



TWENTY TIMES FASTER than other methods—the serrations on the end of this shaft are cut with a button broach in a single pass. Cost per part is reduced substantially because broaching is 20 times faster. This, and hundreds of other applications on file at Colonial, are ample testimony of the tremendous cost-cutting potential that can be yours by utilizing "Unified Broaching" by Colonial. Send us prints of your parts—let us show you how to cut costs over your present machining methods.



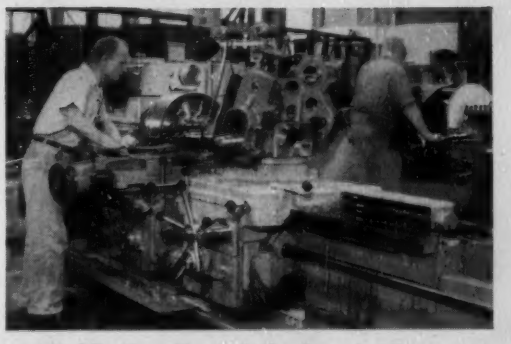


Precision Parts for Piasecki
by GISHOLT Saddle Type Turret Lathes

The latest thing in helicopters is the tandem transport—a remarkable development for vertical, forward and even reverse flying. Piasecki is a leader in this field, volume producing for the armed forces and commercial services.

Speed and accuracy are musts. And, here's why on this job (as on yours) Gisholt delivers both. You get more production because you can pour on all the power and speed the work and tools will take. The great strength and rigidity of Gisholt design assure lasting smoothness and accuracy.

ALL THE FACTS on Gisholt Saddle Type Turret Lathes, in five sizes, are yours for the asking, write today.



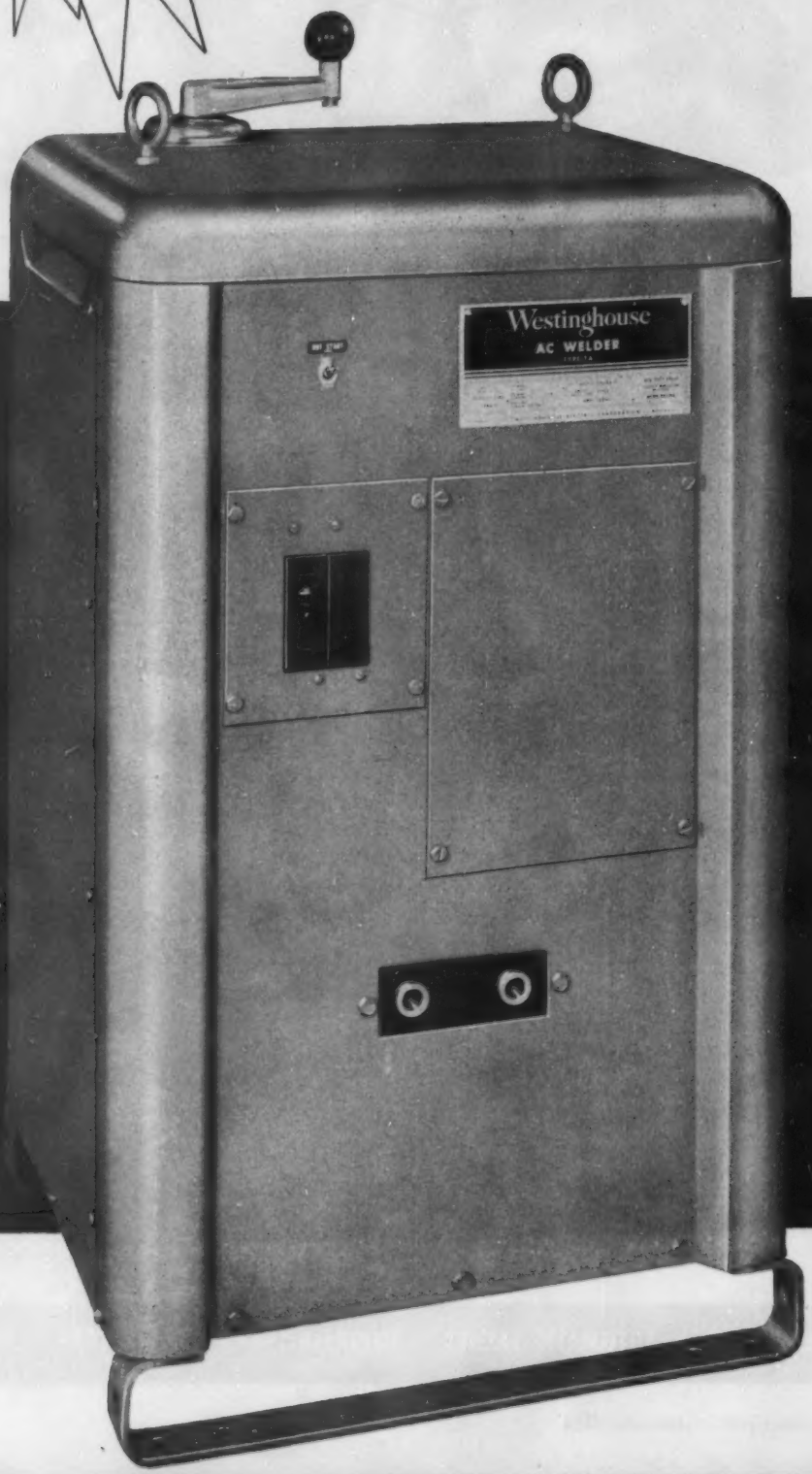
2L Saddle Type Turret Lathe does simultaneous boring and turning on heavy transmission bushing for Piasecki Helicopters.

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

THE GISHOLT ROUND TABLE—*represents the collective experience of specialists in machining, surface-finishing, and balancing of round and partly round parts. Your problems are welcomed here.*

TURRET LATHES · AUTOMATIC LATHES · SUPERFINISHERS · BALANCERS · SPECIAL MACHINES

THE NEW WESTINGHOUSE A-C WELDER...



TYPE "TA"... the newest

and most modern A-C arc Welding machine

This new A-C Welder again fills out the complete line of the most modern welding equipment available today . . . a welder that is a worthy companion of the recently announced Westinghouse "RA", d-c machine.

The *completely new* Westinghouse "TA" is an a-c welder that provides easier operation, a wider work range, higher operating efficiency and higher quality welds. Each design feature is the result of continuous research and years of "on-the-job" welder performance.

This new compact a-c welder is another step ahead by Westinghouse, the pioneer in welding processes and equipment manufacturing.

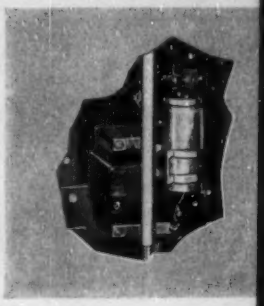
Here are some of the many exclusive features of the new "TA" that can mean superior welding performance to you.

thermal overload protection

There's no problem of coil overheating because of the exclusive AB De-Ion Circuit Breaker. A positive, quick-acting Thermoguard imbedded right in the transformer windings energizes a shunt trip mechanism, causing the circuit breaker to automatically open before harmful high temperatures can be reached.

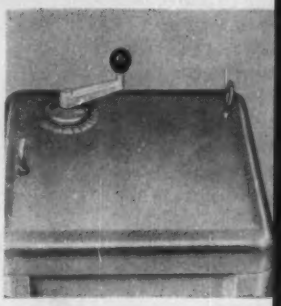
hot start control

For that instant arc when starting to weld, the hot start control automatically supplies an additional surge of current to the welding arc the instant it is struck. It enables the operator to strike an arc at low current settings and is particularly helpful on applications involving small diameter electrodes and light metal.



single range current control

You just can't beat the ease of current adjustment of this new A-C Welder. A single, conveniently topmounted control provides current settings throughout the entire range—minimum to maximum—without changing cables, taps or switches. An easily read calibrated dial is provided as a part of the control.



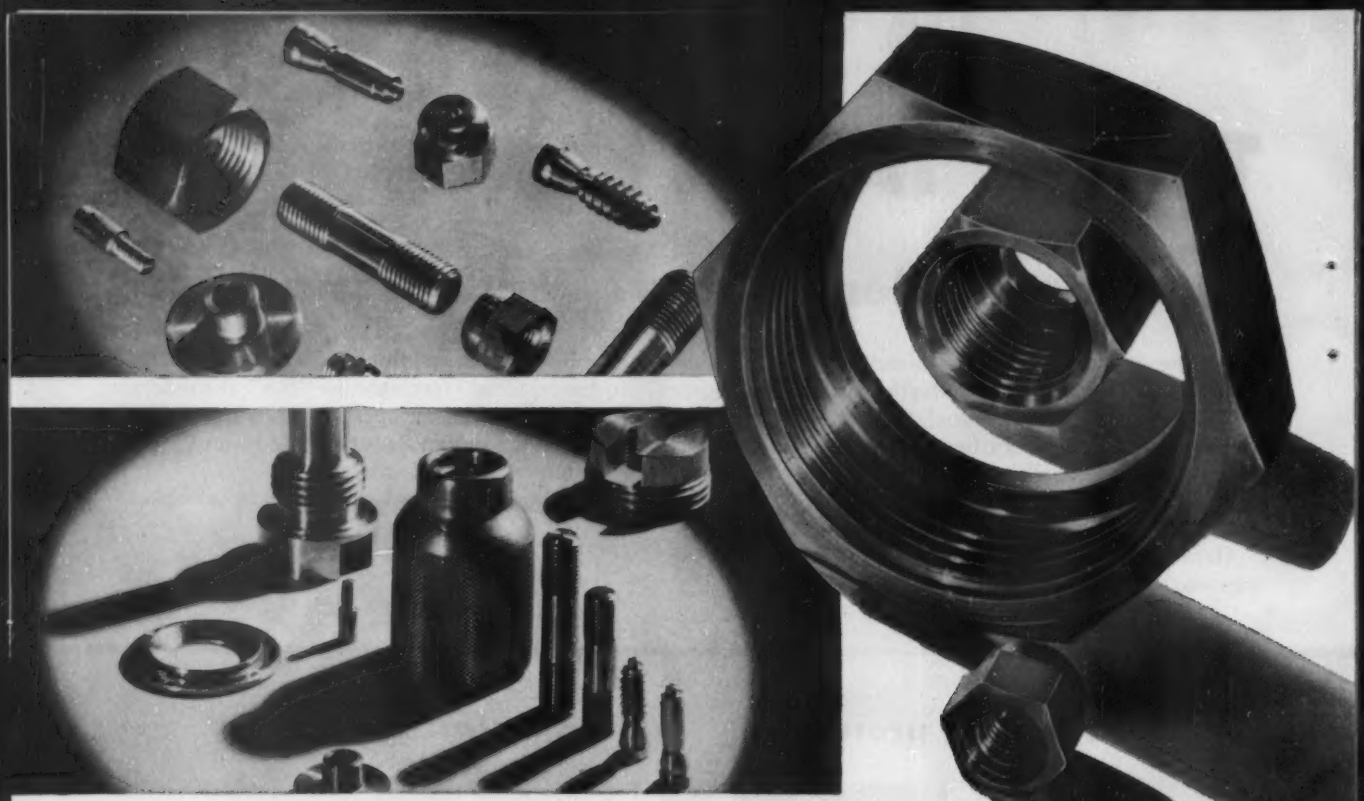
weatherized construction

You can count on the new TA Welder for *any* application . . . regardless of location! The new Westinghouse TA is designed to provide uninterrupted service with maximum protection against dirt, dust, water and weather. The enclosure case is BONDERIZED and all external control parts are shielded or recessed for added protection.

See your nearest Westinghouse representative for the free booklet, B-6367, on the all-new Westinghouse "TA" Welder, or write to Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pennsylvania. J-21843

YOU CAN BE SURE... IF IT'S

Westinghouse



For bar stock that fits your product and your machining operations . . .

specify USS Stainless Steel

• United States Steel's mills are producing Stainless Steel bar stock in the widest selection of shapes, sizes and grades in the industry. So, when you specify USS Stainless Steel for your bar needs, you are sure of getting stock that's exactly right—that will most aptly fit your machining facilities and give you best results in the products you are manufacturing.

You can make a better product, and in many cases, lower your production costs by calling in one of our Stainless Steel representatives. He works with you in selecting the right bar stock of USS Stainless Steel for your job.

USS Stainless Steel bars are furnished cold finished and hot rolled in rounds, hexagons and all other shapes you may require. Sizes range from the smallest to the largest you could conceivably need. All grades are available, including several free-machining types.

On-the-spot service

on Stainless Steel bars

For prompt service on your immediate requirements, call your Stainless Steel warehouse distributor. He can offer you unbeatable delivery on USS Stainless Steel bars.

UNITED STATES STEEL CORPORATION, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO • NATIONAL TUBE DIVISION, PITTSBURGH
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
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USS STAINLESS STEEL

SHEETS • STRIP • PLATES • BARS • BILLETS • PIPE • TUBES • WIRE • SPECIAL SECTIONS

4-1283

UNITED STATES STEEL

Versatility!

YOU CAN MAKE ALL THESE GEARS ON ONE MACHINE

Continuous-tooth herringbone gear
Single helical gear
Double helical gear with staggered teeth
Straight-tooth (spur) gear
Double helical, staggered-tooth gear with center groove
Herringbone rack and pinion
Gear component with integral shaft
Cluster gear

FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONN.
Plants: Ansonia and Derby, Conn., Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Cambridge (Mass.), Akron, Cleveland, Chicago, Los Angeles, Houston

Reduce MANUFACTURING COSTS— THROUGH FASTER CUTTING!

The gears you see above are only some of a wide variety of precision gears and parts that you can make on a Farrel-Sykes "Twin-Head" generator.

Manufacturing costs will drop as the unequalled speed, accuracy and convenience of this machine keeps production flowing fast. Setups and change-overs are effected so rapidly that down-time is held to a minimum. Operators prefer the machine for its ease of operation, such as rapid selection of speeds and feeds, simple adjustment of cutters, and positive control of infeed.

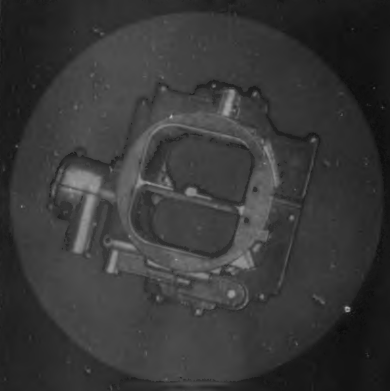
Write now for details of this versatile gear generator. You will find it profitable in your shop.

FB-921

Farrel-Birmingham ®

DRILL-SPOT FACE-COUNTERSINK-REAM-TAP

20
individual operations



...on one Part
...on one Machine
...in ten Seconds!

...that's precision production on a **Morris**
MOR-SPEED Machine

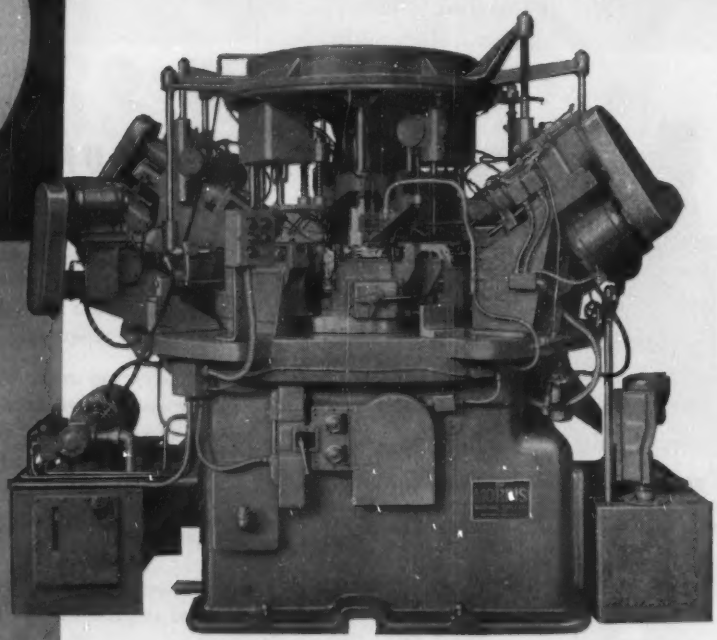
a better product at less cost with precision PLUS production

It's easy to say "the way to higher production and lower costs lies in special machinery." The sky-high price and limited application of a "special" often makes this solution impractical.

But Morris Engineers have developed a time-tested method for delivering precision production at lowest cost . . . *without* a staggering investment. Morris MOR-SPEED Machines combine *standard* machine units in a special design that offers all the advantages of "special machinery" without the big price tag.

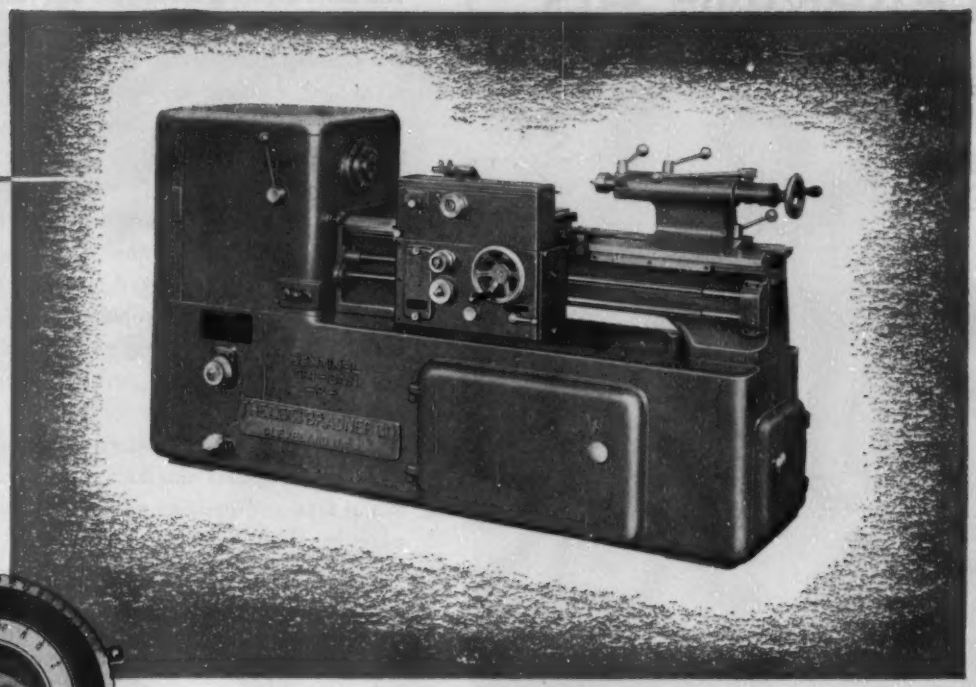
The machine illustrated is a good example: standard base, standard indexing table, standard center column, standard straight and angular drilling heads, standard coolant and hydraulic units plus a minimum of special tooling. The result is "special" machine production at a very special, low cost.

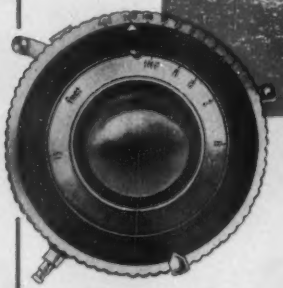
Your drilling, tapping, reaming and similar operations may be adaptable to a MOR-SPEED solution. It costs you nothing to find out! *Write today for complete details.*



Morris

THE MORRIS MACHINE TOOL CO.
933 HARRIET ST., CINCINNATI 3, OHIO





CRI-DAN BRIGHTENS THE PRODUCTION PICTURE AT Eastman Kodak

Over a half-million lens mounts for Kodak cameras have been threaded on the Cri-Dan "B" during the past year. This fact, coupled with the extreme precision demanded in camera manufacture, dramatically proves that CRI-DAN Threading Machines combine accuracy and speed to an extent heretofore unknown.

Key to CRI-DAN's efficiency is the single carbide point tool which threads with unusual speed and accuracy. Changeover is fast and tool cost low.

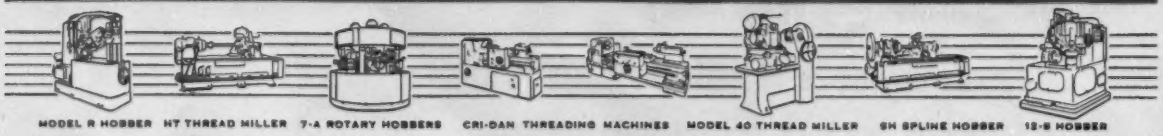
Take steps now to brighten your production picture. Get all the facts on CRI-DAN Threading Machines from your Lees-Bradner representative, or write direct.

CAPACITIES

Spindle Speed (In 24 Steps)	145 - 2800 RPM
Swing Over Saddle	4"
Swing Over Bed	13"
Capacity Between Centers	36"
Max. Thread Length	2½"
Max. Diameter Thread	4"
Rated Max. Capacity	10 TPI
Max. No. of Thread Starts	12
Max. Taper Thread	25° Incl.
Max. No. Passes Per Thread	32

the LEES-BRADNER Company

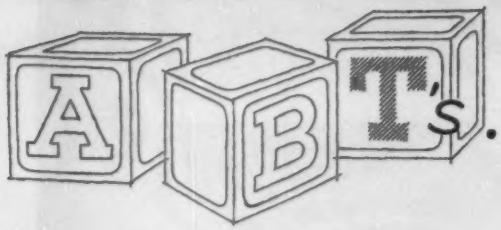
CLEVELAND 11, OHIO, U. S. A.



MODEL R HOBBER · HT THREAD MILLER · 7-A ROTARY HOBBERS · CRI-DAN THREADING MACHINES · MODEL 40 THREAD MILLER · 9H SPLINE HOBBER · 12-S HOBBER

IF YOU THREAD OR HOB . . . GET A BETTER JOB WITH A LEES-BRADNER

LEARNING HIS

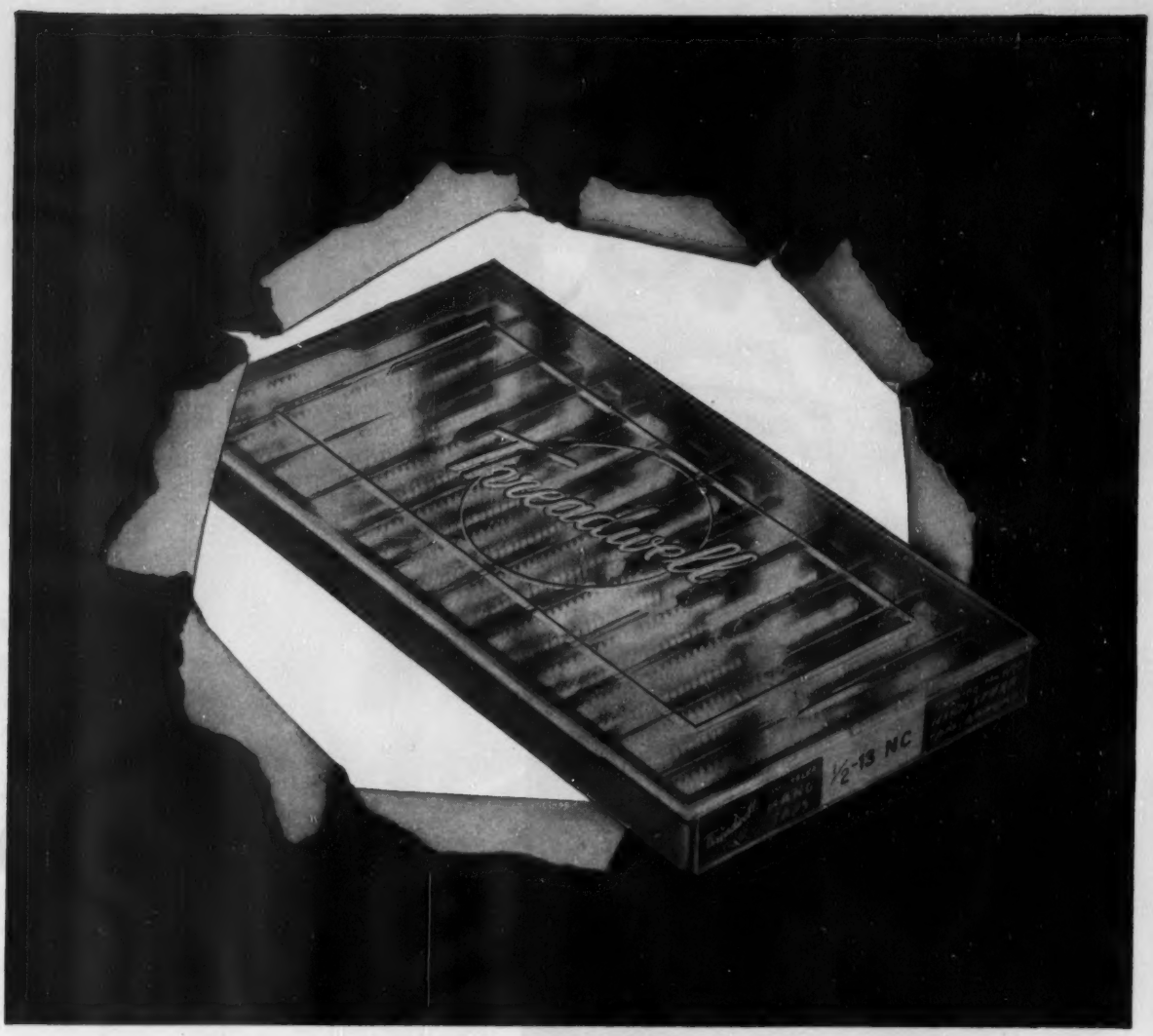


...

"You can't expect a seven-year old, just beginning to cross his T's, to understand the intricacies of a T Lathe. But kids say bright things. This youngster, on a recent plant tour, summed up the outstanding characteristic of the 60" T Lathe, exclaiming: "Gee, that powerful machine sure is gentle."

Yes, the T Lathe is "gentle"—is sensitive to the most delicate cut. T Lathes are designed specifically for thin-wall, short length and large diameter work that characterizes jet engine and other production. These lathes have solved the problem of straight and contour facing, turning and boring parts formerly machined on over-size, over-costly, over-clumsy conventional lathes and boring mills.

Far faster, more sensitive and accessible to the work, they save cost, time and floor space. There is a T Lathe to cut time and costs on your large diameter, short length parts machining. Write for Bulletin No. 215, The Lodge & Shipley Co., 3055 Colerain Avenue, Cincinnati 25, Ohio.



NOW Threadwell quality is protected *in new plastic packages!*

Threadwell Distributors are now receiving Threadwell taps in striking new lifetime plastic packages.

These packages will not only protect the fine quality of Threadwell taps but will also speed up delivery both to the Distributor and the user.

Threadwell is justly proud of the high quality of its products and this new package is one more evidence of our policy to produce the best possible product at the lowest possible price. Our only business is the manufacture of fine cutting tools. We intend to stick to our last . . . first.

see your

Threadwell

distributor

THREADWELL TAP & DIE COMPANY • GREENFIELD, MASS.

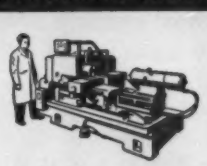
Here's an ideal machine for the steel stock room or lathe department for miscellaneous small lot shaft work. This new Sundstrand single end milling and centering machine automatically maintains a definite relation between the ends and centers. Combined milling and centering is more accurate than conventional methods as it is not necessary to re-chuck the work between the milling and centering operations, and the centers are held square with the end of the shaft. Combining the operations also saves the handling time and the floor space ordinarily required for a second, or more expensive machine. The model shown above handles work from ¾" to

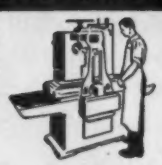
AUTOMATIC LATHES | SIMPLEX RIGIDMILS | DUPLEX RIGIDMILS

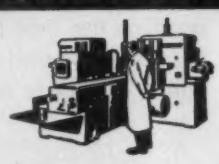
SUNDSTRAND

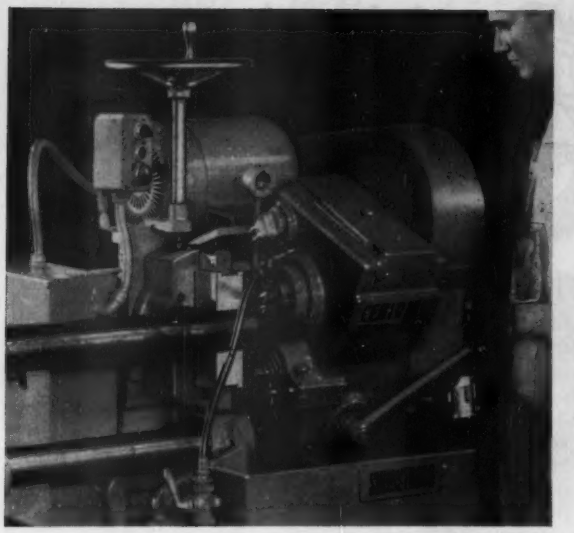
"Engineered Production" Service*

*REG. U.S. PAT. OFF.

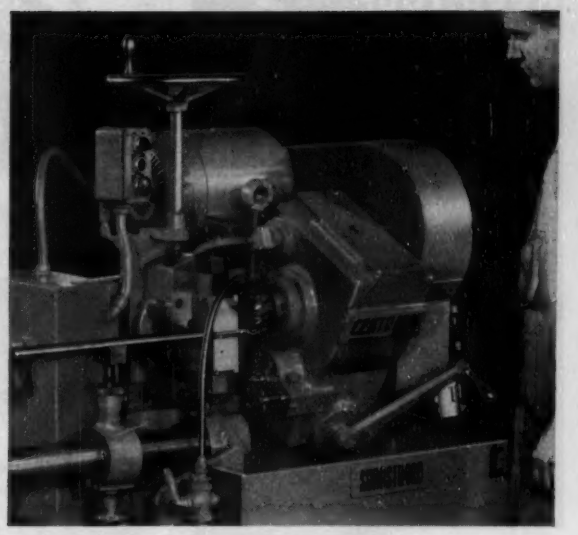








Close up of the milling operation on a large diameter shaft.



Close up of the milling operation on a small diameter shaft.

3½" diameter by 5" to 48" long. Special work supports can be provided to accommodate longer shafts. If your work is larger than 3½" diameter, specify maximum diameter and length of shaft.

65 Out of 105 Minutes Saved On Lot of 40 Workpieces

In addition to being accurate, the CENTRMIL is fast. Just a few simple adjustments and the machine is ready for individual pieces or small lots. A typical example shows one manufacturer saving 65 out of 105 minutes on a lot of 40 pieces compared to previous method of facing to length and centering.

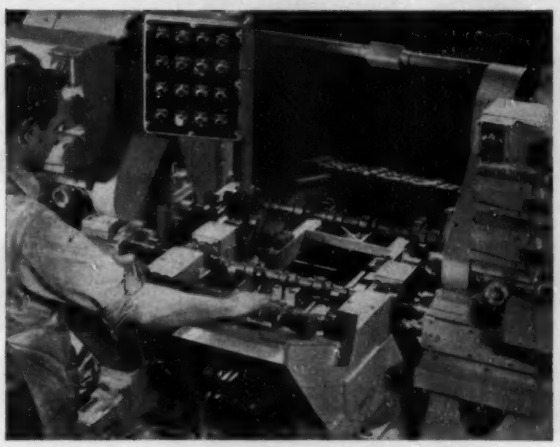
Free Data

Write for more detailed description and specifications on this new Sundstrand single end milling and centering machine. Ask for bulletin 144.

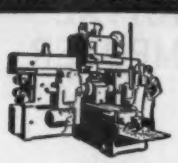
For Higher Production Work

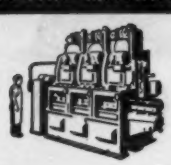
DOUBLE END MACHINES

Double end CENTRMILS are available for higher production requirements. Both ends of the workpiece are milled and centered simultaneously. For instance, the machine illustrated below mills and centers 100 camshafts per hour. The machine is front loaded from a hopper and automatically unloaded at rear. It is also provided with automatic clamping.



TRIPLEX RIGIDMILS | SPECIAL MACHINES





SUNDSTRAND
Machine Tool Co.
2533 Eleventh St. • Rockford, Ill., U.S.A.

Keep Your on the OLIVER Line — Cost Cutting Production Boosting MACHINE TOOLS

OLIVER DRILL POINTERS

Properly machine ground drills give better performance. OLIVER Drill Pointers, with each lip doing equal work, give balanced cuts—more accuracy — more perfect holes — more efficiency — longer drill life.

As Illustrated:

No. 21 Oliver Bench Drill Grinder. Hand operated for Drills No. 57 to ½".

No. 510. For Drills ¼" to 3" 2-3-4 flute.

OLIVER DIE MAKING MACHINES

Efficient, speedy and accurate — effecting great savings in time and costs. Skilled labor is not required for sawing, filing and lapping operations.

Available in 5 Models.

Bench Model S-1 (Illustrated) — Single Speed Die Maker for use on Tool Steel up to 1" Thick.

Heavy Duty Model (Illustrated) — 6 speeds, works in metal up to 3" thick, has variable strokes to 5" with hydraulic feed.

OLIVER ACE UNIVERSAL TOOL & CUTTER GRINDERS

Keep your most difficult cutters sharp with Oliver ACES. They excel on high speed and Tungsten-Carbide work. Direct reading for clearances reduces fatigue — eases operators' jobs.

The ACE excels for grinding face mills up to 15" —also, slab mills • slitting saws • all types cutters and reamers.

2 Models: Heavy Duty (Illustrated) and Standard.

OLIVER 20" TEMPLATE TOOL BIT GRINDER

Efficiently powered by a 3 h.p. motor, this OLIVER Machine grinds on the periphery of a 20" wheel. Capacity: tools up to 1½" wide x 1¾" high from 0 to 20° clearance. The OLIVER is developed for production sharpening of single point Tungsten Carbide and high speed tools—offers increased production, lower tool costs and savings in man-hours. Extremely fine finish assured.

Write Today For Complete Information

OLIVER INSTRUMENT CO.

1414 E. MAUMEE • ADRIAN, MICHIGAN

Backlash

EXTRACTS FROM CURRENT LETTERS TO THE EDITORS

Hard Iron

We handle a considerable quantity of cast iron in our plant and are having quite a lot of trouble in machining it. Even in the same batch, one casting will cut like butter and the next will be so hard that we wear out the tool in a few minutes. The foundry says it can do nothing about it, as that is just the nature of cast iron, but I am wondering if it would be practical to put the castings through an annealing process, the same as we do for forgings.

Most people around here say it can't be done—that the hardness of a casting is fixed when it leaves the mold. Do you know of any process that would give us a more uniform product? It seems that, if some castings can be soft, the others could be made equally soft by some process.

We have a large contract coming up, and if we run into a big batch of hard ones, we shall probably lose a lot of money on the deal, as we quoted low to get the job.

Name Withheld

It is quite easy to improve the machinability of gray iron by an annealing treatment at around 1300 to 1750 F, depending on the analysis of the iron. You will lose some of the strength and hardness, but you will have better machining and the relief of internal stresses. A detailed article on this subject appears in PRODUCT ENGINEERING, *May '54, and tear sheets may be obtained by writing to the editor at 330 W 42nd St, New York 36, N. Y.*—ED.

Old Stuff

I noticed at the end of your article, "New Russian Concept of Cutting Tools" (*AM*—April 12 '54, p170) you asked for comments. I used the same method a couple of years ago when I was a perishable-tool engineer on the Kaiser-Frazer aircraft program. I used the rough and finish cut on reamers, drills, and other cutting tools. In one case, I increased production ten times with tools that had been thrown away. The Russians have nothing new.

Leonard S Parris

Jones, Mich.

GRINETICS

BY D G SMITH

LINEAR MOTION

DIGITAL COMPUTER

RUNNING GEAR

Republication rights reserved

World's Smallest Air Drill...

It's Really Amazing!

3/16" HEAVY DUTY DRILLING

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WEIGHS LESS THAN 1½ LBS.

Highest precision construction makes this drill revolutionary!

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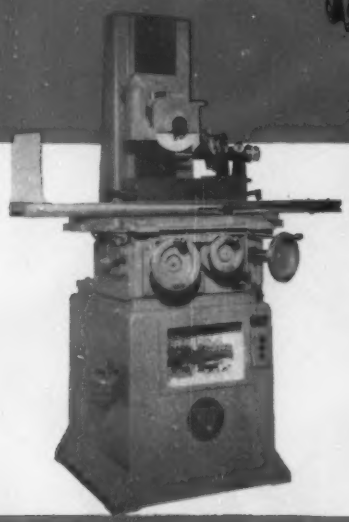
have built-in accuracy for top performance in your toolroom



Every part in a Reid is designed and engineered to provide the extreme accuracy that toolmakers require for dependable results on fine tooling. Each feature which contributes to more precise work is rigidly tested, under acutal shop conditions, to determine its *right* to be part of a Reid Grinder. Not until the value of each individual feature is proved — in terms of top performance — is it presented to industry. A Reid Surface Grinder will prove a sound investment in quality production for *your* toolroom.

Better Surface Finish

. . . with the motorized spindle turning on pre-loaded bearings to eliminate wheel chatter, and the work table running smoothly on hand-scraped ways, ground pieces have a visibly finer surface finish.

Easier Operation

. . . finger-tip level controls eliminate stretching and bending, lessen operator fatigue. And, the electrical controls are fully visible, yet protected behind a transparent shatter-proof panel.

Rugged Design

. . . all mechanical units built around rugged one-piece column casting to insure permanent alignment of cross-slide saddleways and vertical headways. Column is mounted on heavy cast iron base for maximum rigidity and freedom from vibration.

Capacity-

6" x 18" x 17¼" from center of spindle to worktable. Table speed (Model 618V) 12 to 35 feet per minute.

PLAN FOR REPLACEMENT!

Get full details on Reid Grinders with built-in accuracy for better performance — please request Bulletin 618-1

Reid Brothers Company, Inc.

BEVERLY, MASSACHUSETTS

Protest

I resent Mr Staffani's insulting remark (*AM*—May 10 '54, p101) that many of the small tool and die shops are just opportunists out to make a fast buck, and incapable of doing first-class work. Most of the small shops were set up by skilled toolmakers who wanted to run their own businesses and have made great sacrifices to do so. They simply can't afford to do shoddy work, or they would be out of business in no time and would lose everything they have worked for.

As a matter of fact, customers' tool inspection dep'ts are usually rougher on purchased tools than they are on

those made in their own toolrooms, and they don't hesitate to reject a tool that has an imperfection they would overlook if it had been made in their own shop.

It's a precarious business, anyhow. We are the first to feel the pinch when things get slack, and are hounded to death for faster and faster deliveries when the heat is on. Maybe Mr Staffani doesn't realize that if it hadn't been for the small shops our defense program would have been delayed a year or more after Pearl Harbor. It was the big plants that made the planes and tanks and guns, and got all the glory and Navy E awards, but it was the little fellows who made it possible by turning out the tools to do it. Sure, we made money. Why not? But only a fraction of what the big companies made. And we made it the hard way, not by juicy cost-plus contracts.

And by the way, what kind of a plant does Mr. Staffani work in that has its tool corrections made by the plant maintenance dep't? All the plants I know of make corrections, if needed, in the toolroom. Plant maintenance takes care of repairs and breakdowns, and such things as cleaning and general housekeeping.

Robert J Hill
Chicago

Bravo!

Mr L E Wilson's letter (*AM*—May 10 '54, p98) has aroused the beast in me. For years I have griped about lubrication and instruction manuals not properly describing the machine, but I have never done anything about it. I guess I just took the easy way out and figured that either I was too dumb to understand the manual, or that it was just an accident that I was unlucky enough to get the one wrong copy the company sent out. Things will be different from now on.

After this, every time I find a mistake in a manual, I am going to write a nasty letter, addressing it to the personal attention of the president of the company. There is no excuse for sending out incorrect information. I know that changes are made in machines after the manual has been printed, but it is a very simple matter to mimeograph a "Correction Sheet" and stick it to the inside front cover. My congratulations to Mr Wilson for having the courage to speak out on a matter that concerns so many of us.

H A Treleven
Sioux City

Says Me!

It sure was time that somebody put a flea in the ear of some manufacturers—not only machine tool makers—and woke them up to the fact that many of their manuals are out of date. Mr Wilson (*AM*—May 10 '54, p98) deserves the thanks of a lot of people.

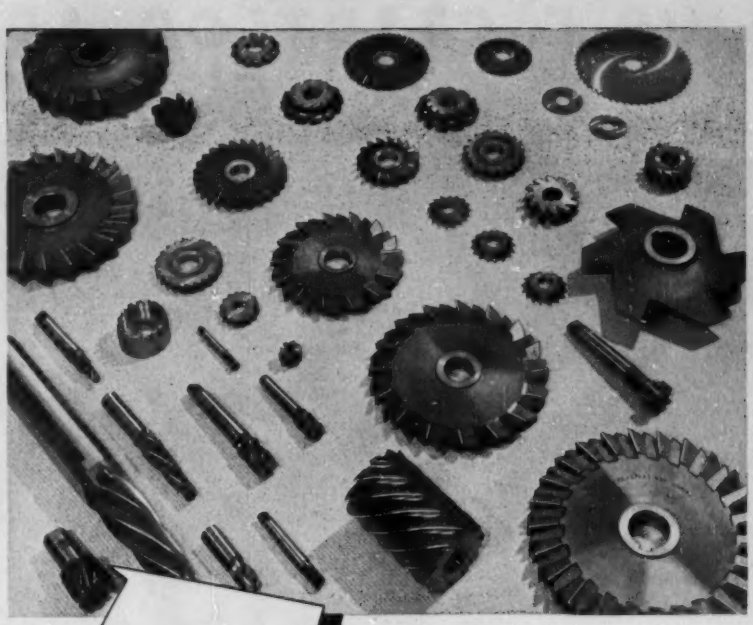
Robert Shaw
Cleveland

Sorry

Why don't you perforate your Reference Book Sheets so they can be taken out more easily?

A E Banks
Glassboro, N J

Second Class postal regulations do not permit pages to be perforated or otherwise indicated as being suitable for removal from the book.—Ed.



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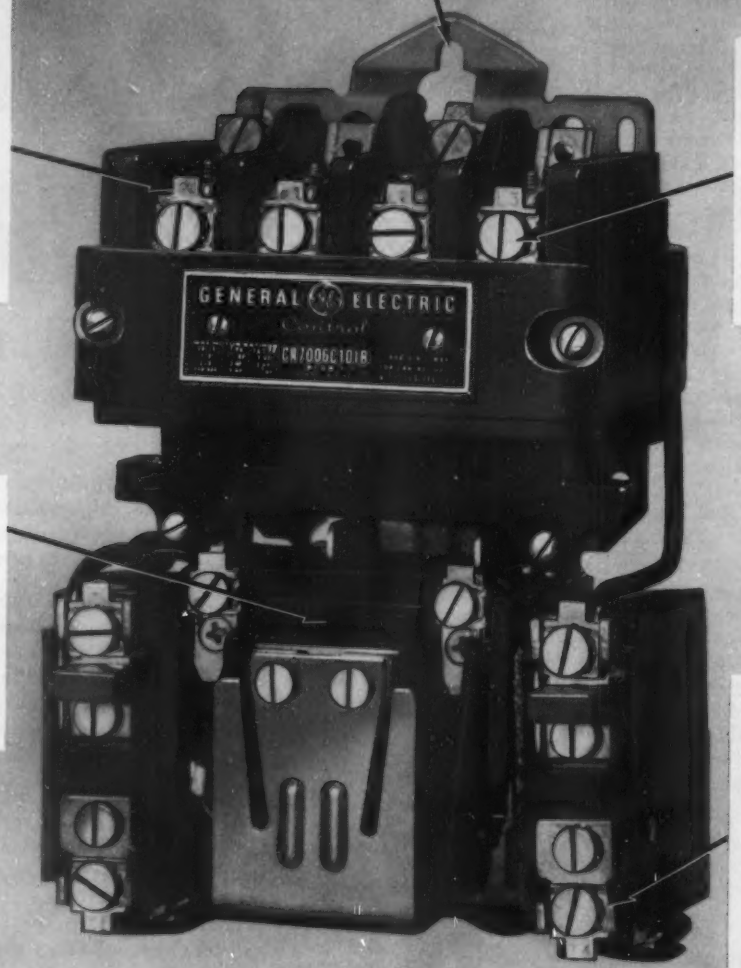
"G-E STARTERS ARE EASIEST

EASY MOUNTING. Three screws on the back of the enclosure hold the starter in place. To mount the starter just slide the slotted openings over the screws. The starter is then supported while you tighten the screws, which are easily accessible from the front. The same type mounting can be used for mounting the enclosure.

CLAMP-TYPE TERMINALS. Solderless clamp-type terminals are easy to reach from the front. Wiring to the terminals is simplified as the terminal clamps ride out on screws. Just slide the stripped down wire under the terminal clamp and tighten down the screw.



PANHEAD SCREWS. Large-size panhead screws on all terminals make it easy to get a tight fit. Wide, deep slot and a hardened head take full screwdriver width, and prevent burring or screwdriver slippage.

PROTECTED COIL. Starter coil is protected from screwdriver slips during installation. The strongbox coil, completely enclosed in plastic, won't let accidental blows, dust or moisture get at the coil.

COMPLETELY FRONT WIRED. All wiring, including the interlock and overload relays, is easily done from the front. The screwdriver goes straight into the clamp-type terminals which are completely free for your wiring since all factory wiring is to separate terminals.

TO INSTALL"

Says Gordon Smith, President of Gordon Smith and Company, Inc., Bowling Green, Kentucky

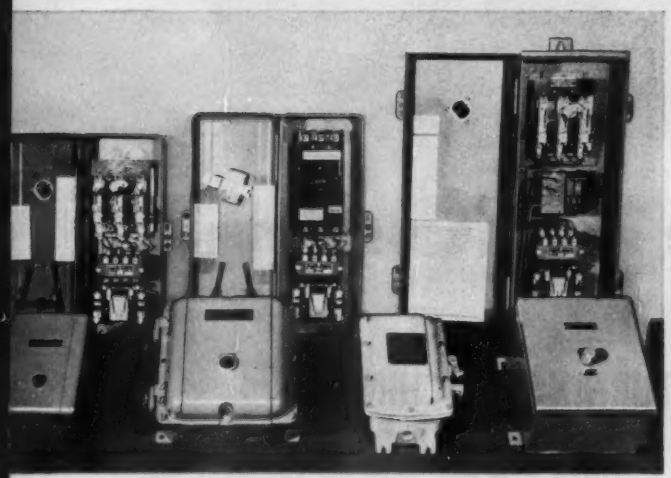
Gordon Smith and Co., Inc., manufacturer of engine and electrically driven air compressors, has standardized on G-E magnetic starters because they are reliable and easy to install. Customer satisfaction has "sold" this company on G-E starters.

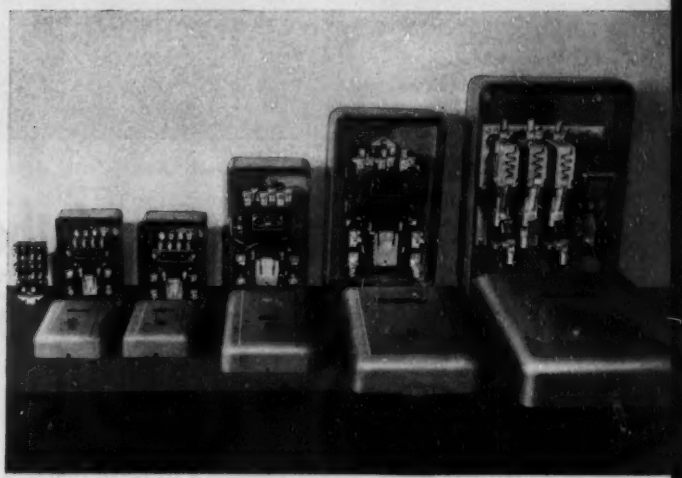
ADDITIONAL FEATURES of the magnetic starter that contribute to easy installation and reliability are knockouts in the top, back, sides and bottom of the enclosure; a permanent air gap that prevents contacts from "sticking-in"; bi-metallic overload relays that are easily adjusted for manual or automatic reset.

FOR MORE INFORMATION contact your nearest G-E Sales Office, or Distributor, or write Section 730-52, General Electric Company, Schenectady 5, N. Y.

"WE'VE NEVER HAD A CUSTOMER COMPLAINT DUE TO STARTER FAILURE," says Gordon Smith. This customer satisfaction has come from the reliable operation, ease of inspection and maintenance, and long life of General Electric magnetic starters.

FOR EVERY MOTOR-STARTING APPLICATION—A G-E MAGNETIC STARTER





NO MATTER WHAT YOUR REQUIREMENTS, you can get a G-E starter to fit your application. The complete line of enclosures includes standard, watertight, dust-tight, explosion-proof and semidust-tight. Enclosures that meet JIC specifications are also available. Full voltage starters rated up to 200 amperes are available in NEMA sizes 00, 0, 1, 2, 3, 4 and 5.

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MANUAL STARTERS — MAGNETIC STARTERS — PUSH BUTTONS — COMBINATION STARTERS — RELAYS — REDUCED VOLTAGE STARTERS — SOLENOIDS — LIMIT SWITCHES

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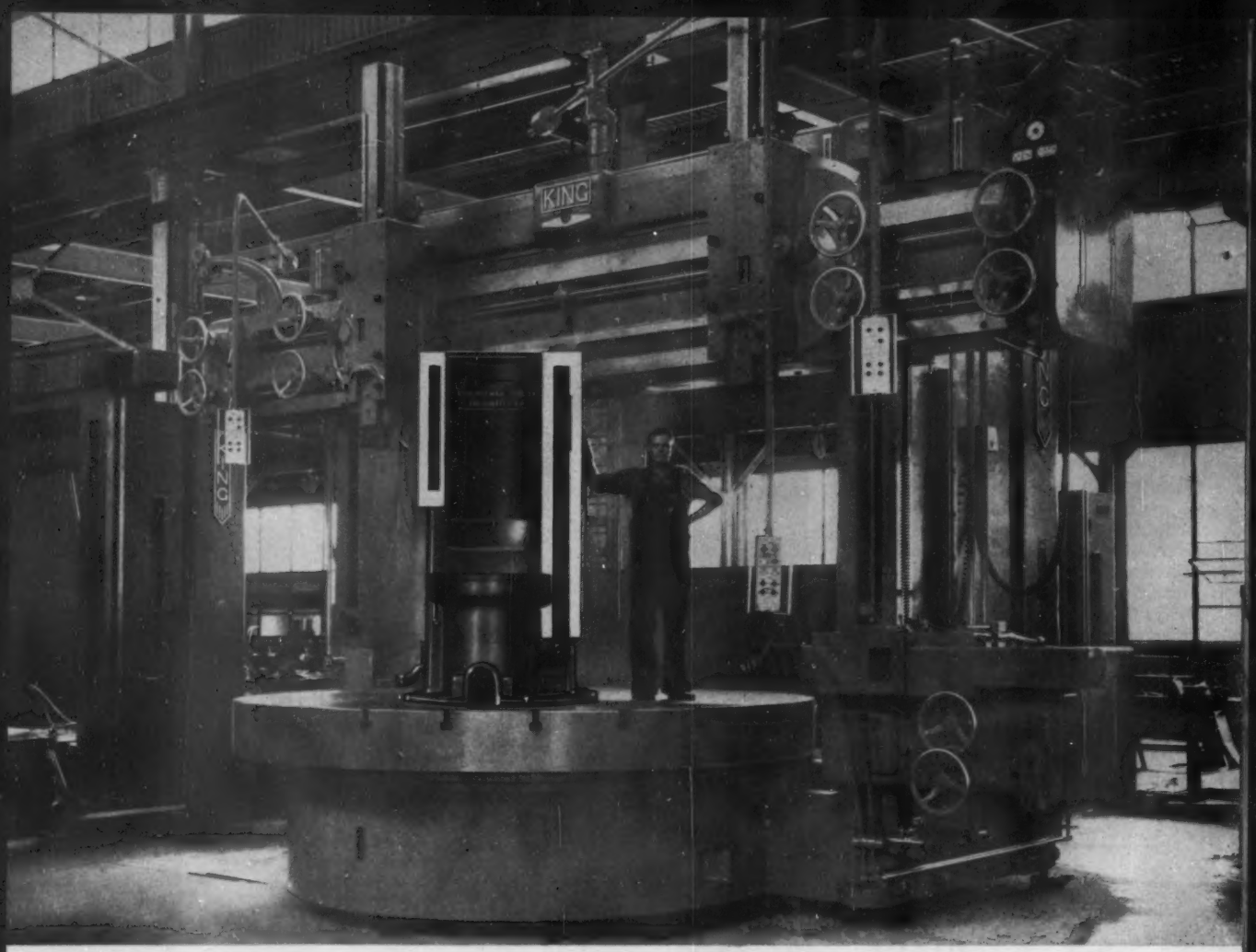

Meet "both ends" of the KING size range

30" to 144"

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Pictured above, on the table of a massive 144" KING® Vertical Boring & Turning Machine, is the base and column of a rugged 30" KING . . . the "big" and "little" of the KING size range. KING and *only* KING "covers the field" with ten sizes: 30" and 36", one head on rail—42", 52", 62", 72", 84", 100", 120" and 144", one or two heads on rail. All size KINGS are available in a variety of head combinations, with or without side head.

KING'S wide size range lets you select the *right* size machine to fit *your* boring, facing, and turning requirements. These extra-heavy, extra-rigid machines have the speed, power, ease of control, and dependable accuracy that are essential for turning out your work with maximum efficiency in minimum time. See your KING distributor—or write us direct —for complete information on the many outstanding features of KING machines.

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KING MACHINE TOOL DIVISION

Vertical boring & turning machines . . . 1150 TENNESSEE AVE., CINCINNATI 29, OHIO

●Spot News of Metalworking . . .

• ULTRASONIC DRILLPRESS . . .

Sensitive 50-watt ultrasonic drill, now in production in England, permits accuracy to 0.0005 in., surface finish to 8 mu in. Unit is light bench-stand rig with three velocity transformers and tip diameters of ⅛, ¼, and ⅜ in. Max depth of any shape to be drilled is ½ in.

• SEE-THROUGH STRIP . . .

Strip as thin as 0.0001 in. by a few inches wide will soon be rolled for electronic and other purposes. Special mill achieves exceptional uniformity in gage. And custom roller melts special alloys to suit customer requirements under exceptional metallurgical control.

• AUTOS FOR RED CHINA . . .

China's first automobile plant, at Mukden, may be in partial operation by year's end, according to reports reaching Hong Kong. Some 4000 workers are said to be in training, a few hundred of whom (party workers, students, technicians) have been sent to Russia for advanced training. Red government is urging prospective subcontractors to improve parts quality.

• STATIC . . .

Defense Dept's requirement that new government machine tools be certified against radar, radio and TV interference is being sidestepped by some builders, who are quoting only on machines with a-c drives. Navy has 1½ pages of specifications dealing with radar interference included in quotation form for a column-type drilling machine.

• MORE ON THE KOLESOV METHOD . . .

Hungarians claim that by positioning a Kolesov tool (*AM*, Apr 12 p170) with the bit parallel to the work instead of at right angles, vibration is cut substantially.

• 0.00004-IN. TOLERANCES? . . .

Klement Gottwald Electric Works, Hungary, claims it can insure accuracy to within 0.00004-in. with electrical discharge machining.

• FORD PLANT IN SPAIN . . .

A new, larger Ford truck and tractor plant is being built at Barcelona on the site of the old Ford plant, built in 1923. Equipped with new types of tooling, the plant is expected to reach an annual output of 6000 trucks and tractors.

• JAPANESE TITANIUM FOR THE US . . .

Japan plans to export 1123 tons of titanium sponge this year—777 tons to the US, 97 to England, 249 tons to other countries—almost 95% of total output.

• PURE METALS DIRECT FROM RAW ORE . . .

Revolutionary high-intensity-arc process for reducing metals from raw ore reverses conventional processing. Instead of building up heat to point necessary for ore reduction, as in a blast furnace, temperature is raised to 10,000 C, then dropped as metals vaporize from ore electrodes. Story on p174.

Look for These Features in Drill Bushings

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- **MATERIAL**—High chrome and carbon oil-hardening steel for maximum wear.
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- **PROMPT DELIVERY**—from stocks of standard sizes in Detroit, New York, Los Angeles, and London, Canada.
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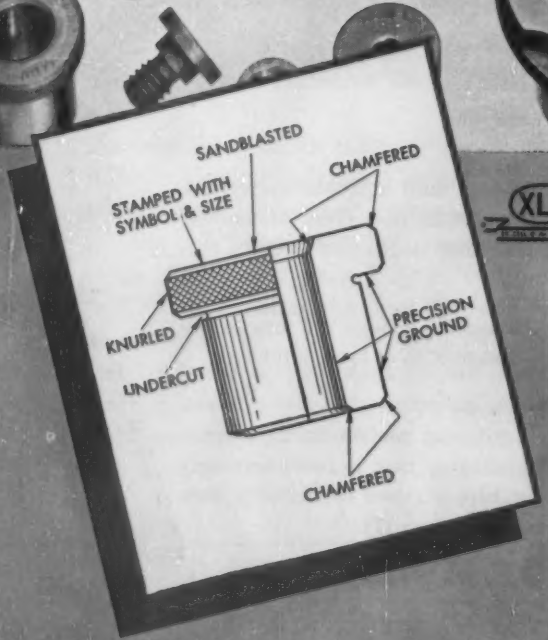

Your purchasing and engineering departments should have copies of this Ex-Cell-O Bushing Catalog No. 35936. Just ask for the number of copies you would like.

EX-CELL-O CORPORATION

DETROIT 32, MICHIGAN

MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING SPINDLES
CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS
AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

54-28

Washington . . .

Policy changes for the five-year Defense Amortization Program are in the works. Producers of defense products—as defined by ODM expansion goals—may soon be able to get fast tax write-offs on costs to modernize existing facilities—even though installation of new equipment does not actually boost capacity.

• • •

Up to now, accelerated tax amortization has been granted only for actual expansion. That is, construction of new plant and equipment, or addition of new facilities to an old plant—either of which results in extra output of defense goods. Now, ODM is considering the use of this tax incentive under its policy of "maintaining the mobilization base."

Idea is to encourage defense producers to replace old equipment in order to cut production costs, generally make for more efficient production—even though there's no net increase in output. Plan must first be okayed by the interagency Defense Mobilization Board.

• • •

More liberal depreciation policy in general is now a certainty, as well. The Senate Finance Committee has ready for Senate debate the big overhaul of the tax laws—and a prime provision is to permit a company to write off half the cost of new equipment in five years. Only some minor tinkering on how to stretch out the last half in the life of a piece of equipment is left for the Senate Finance Committee to handle.

Whether used tools will get the faster amortization is still hanging in the air. Business spokesmen are still seeking the liberalization, but the House in passing the bill left that provision out.

• • •

Here are some of the significant changes the Senate committee has made in the house legislation. They must be worked out before final passage: the Senate committee killed a house provision that would permit payments to a retired partner in a firm to be listed as gifts for the first five years of retirement. The Senate group made the payments income to the retired man. On capital gains, the Senate group knocked out a House plan that would cut the holding period from six to three months.

• • •

Pay-as-you-go tax collection from corporations has been approved, so will be in the final bill. The Senate group voted that a firm owing $100,000 or more yearly would have to begin making payments in September of the year the tax is applied. The House had wanted to apply it to $50,000.

Atomic power plants being built by private industry are coming closer and closer to reality. In the last few months, the Atomic Energy Commission has been making tremendous progress in advancing the day on which electrical energy will be generated by steam generated from the heat of an atomic furnace.

• • •

Westinghouse Electric Corp is already placing orders for some of the equipment that's to go into the first privately-built electric plant. Total cost is about $45 million; equipment is a large chunk of that amount. (See page 170.)

The AEC is asking for bids on another kind of atomic power plant—the so-called "package power reactor" for the Army, designed to be transportable and thus useable at out-of-the way locations. Bids are expected to be asked for around the middle of July.

• • •

Military expenditures for aircraft, electronics ammunition and other hard goods in European countries under the Mutual Defense Assistance Program are finally beginning to taper off. By 1957, the Pentagon will have spent some $5-billion dollars in more than a dozen European countries.

But the year beginning this July will probably see total expenditures abroad only around $300 million—and it's not expected to be any more than this from now until the program ends. Theoretically, the program was based on placing no orders that would harm the US production base, and orders would be placed only in existing but unused facilities.

• • •

The program had been under some criticism despite the fact that it was not supposed to result in any loss of business to US producers of aircraft and other arms. But there's no doubt that it had one effect which the US government had desired: in many European countries, such as France and Britain, it did help to prime the pump of many metalworking industries and bring them back closer to the normal conditions of pre-war years.

• • •

The St Lawrence Seaway Project will inspire broadside improvement of harbors and channels all through the Great Lakes area, at Detroit, Toledo, Cleveland, etc. The Corps of Engineers will ask Congress for money to do the work possibly next year. The Seaway will be completed by 1960, under present estimates. Altogether, the refurbishing of the whole area will run into billions of dollars. But it will be billions well spent in the interests of opening up international trade to the Great Lakes area.

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Hydraulic controls • Diesel fuel injection equipment

Detroit . . .

For the second time in as many months, Dodge dealers descended on Detroit to talk up a factory price cut. At the first meeting, dealers hashed over a proposal that prices be chopped $200.

These meetings are getting little if any official attention from Chrysler Corp. Auto makers, of course, establish prices mainly on the basis of the number of units to be built during a year's production run, and whether a cut by Dodge would be sound, or even possible, is a question only Dodge management is prepared to answer.

If a cut comes this year, however—and it certainly is not impossible—it probably would not be announced publicly. The cut most likely would be made in the form of incentive discounts to dealers. That is, if a dealer were to sell a certain quota, he might thereafter be granted a discount proportionately lower than the standard 24.5% discount.

What the effect of the dealer demands will be is probably of more immediate concern than a price cut itself. If they appear often enough, news accounts of these "protest" meetings assuredly will have a disquieting effect on new car sales—at least, sales of new Dodges, which have encountered sales resistance all year. Latest registration figures show that Dodge dealers have sold 38,694 cars this year, as against 72,914 at the same time last year.

Some Detroiters feel there can be no prospect of price cuts until and unless Chevrolet and Ford sales fall drastically. If either of those giants were to announce factory price cuts, the entire industry almost would be compelled to follow suit. It goes without saying that neither Chevvy nor Ford plans a reduction soon, although such action conceivably could come late in the fall.

• • •

Late in June, Packard will complete the second phase of its manufacturing modernization program when it will begin building its own bodies in the Briggs-Conner plant, now a part of Chrysler's Body Div.

Since last December, when Chrysler purchased Briggs, Packard had been in the uncomfortable position of buying bodies from a major competitor.

Packard holds a five-year rental agreement with Chrysler, including an option to buy. Thus, for the first time in 13 years, Packard will again be making its own bodies.

The 760,000-sq-ft plant, built in 1940 for aircraft production, was converted by Briggs to body assembly in 1946.

Chrysler employees at the plant will be transferred to other Body Div. facilities. It is believed that Packard may approach certain employes with a view to hiring them away from Chrysler. However, it is unlikely that hourly paid employes would wish to transfer, since they would lose service credits accumulated at Chrysler. Some supervisory personnel, on the other hand, may choose to stay in the plant and transfer to the Packard payroll.

In September, Packard will begin manufacturing engines, transmissions and axles in its trim new plant in Utica, Mich. Obviously, Packard management is still bent on glamorizing the company to make it more attractive to other independents which might be considering merger.

• • •

Jousting goes on unabated between dealers and auto makers as to how many cars ought to be built.

Frederick J Bell of the National Automobile Dealers Assn took a look at the "miracle of production" and concluded, among other things, that it's possible for an industry to produce itself into a depression.

The industry, Bell said, "is characterized by greed, gluttony and gravy," while dealers are "alternately starved or gorged."

From the other side of the fence recently: a top auto maker, after listening to a group of dealers who handle one of 1954's more successful nameplates complain that the factory was swamping them with new cars, lost patience and pointed out: "The relationship between the factory and the dealer is something like that of a marriage. My suggestion to you who dislike the arrangement is to file for a divorce!"

NADA had something of an argument in profit figures. Net profits of new car dealers before taxes, the Association said, have dropped to 0.8% of sales, as against a 4.3% profit at the same time last year.

But three auto makers' net profits before taxes last year, it noted, ran 16.48% of sales, 6.51% and 5.97%.

Dealers, not manufacturers, said NADA, are bearing the brunt of competitive market conditions. NADA neglected, however, to point out that some auto makers, too, are suffering profit cutbacks this year.

• • •

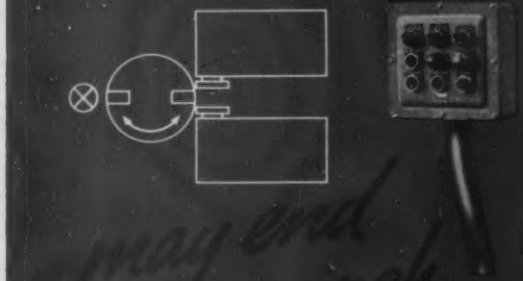
1955 possibilities: Chevvy's Nomad, a station wagon version of the Corvette, is a good bet to show up as a production model—but in steel, not plastic.

Mercury, Pontiac, Ford, Chevrolet, others, probably will install tubeless tires as original equipment on upcoming models. GM is believed to have inquired of its chief supplier whether its capacities are large enough to provide all five GM lines with tubeless tires, if GM decides it wants to make a complete switch.

Duplex Milling

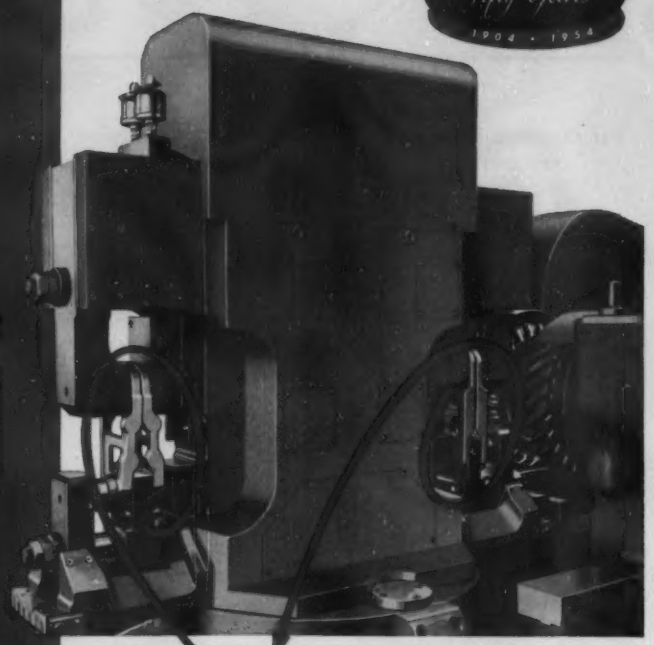
as Engineered by

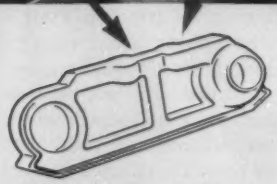
MOTCH & MERRYWEATHER



may end your search

Fifty Years 1904 • 1954





Both sides of tractor side bars are face milled. Production is 240 pieces per hour using high speed steel cutters.

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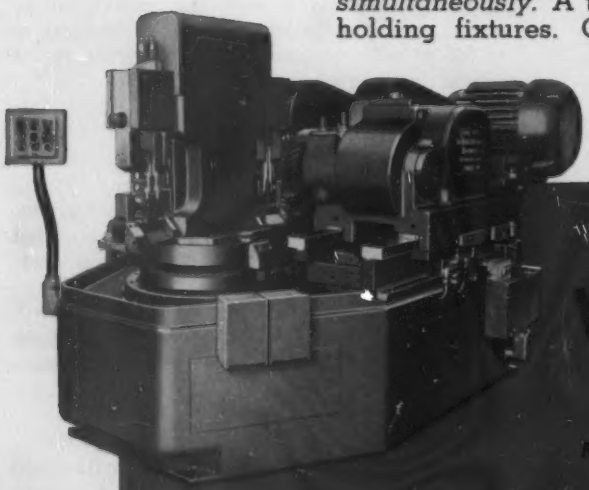

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Machine Tools . . .

New orders for metal-cutting machine tools reached 142.6 in April on the index of the National Machine Tool Builders' Association (see chart).

That is a drop from 169.6 during March. At the same time, shipments are estimated at 302.6 for April, down 25 points from the previous month.

Backlog of the industry shrank to slightly more than four months. A year ago it was eight months.

• • •

Machine tool sales probably will tag along at about the current level the next few months.

Big tooling programs are conspicuously absent. Most of the business being done involves only single machines or 2-3 machines. The same is true of inquiries.

More and more engineering work is being demanded in connection with machine tool sales. Though men in the shop may have to be laid off, as production lags a bit, there is no thought of letting engineers go.

The volume of industry is very large. If a reasonable ratio is converted into orders in the weeks ahead, builders should do fairly well.

• • •

Shipments of metalworking machines in the first quarter of 1954 were about 84% of those in the same quarter a year ago. The actual figures for this year were $328 million, and for last year $380 million.

Note that production in the January-March period was at an annual rate of $1.3 billion.

This information came to light in the first of a series of industrial metalworking machine reports to be issued by the Metalworking Equipment Division of the Business and Defense Services Administration, Department of Commerce.

• • •

More metal forming and shaping machine tools were shipped this year than last. The figure for the first quarter of 1954 is $67 million; for 1953 it was $65 million.

This means that the entire decline took place in metal-cutting machine tools, with shipments this year totaling $260 million, as against $315 million last year.

New orders for metal-cutting machine tools averaged $45 million a month in the first quarter. That compares with $83 million in 1953.

Imports of machine tools of all types have been averaging $2 million a month this year. Last year they ran well over $3 million a month.

Imports from Switzerland accounted for 34% of the January-February total. West German builders got 31% of the business.

• • •

Exports of metal-cutting machine tools amounted to $5.3 million and $8.3 million in January and February. Measure those figures against $13.5 million and $11.5 million in the same months of 1953.

Canada, taking 30% of the total, was the principal market. France took 14% and England 12%.

Japan reappeared as an important market, especially for grinding machines. One-fourth of all exports, in fact, consisted of grinders.

Metal forming and shaping machines show up better than metal-cutting machines in export trade. Sales in January-February, adding up to $7.9 million, were sharply higher than in the same months of last year ($3.6 million).

About 39% of exports went to Canada. United Kingdom took 10%.

• • •

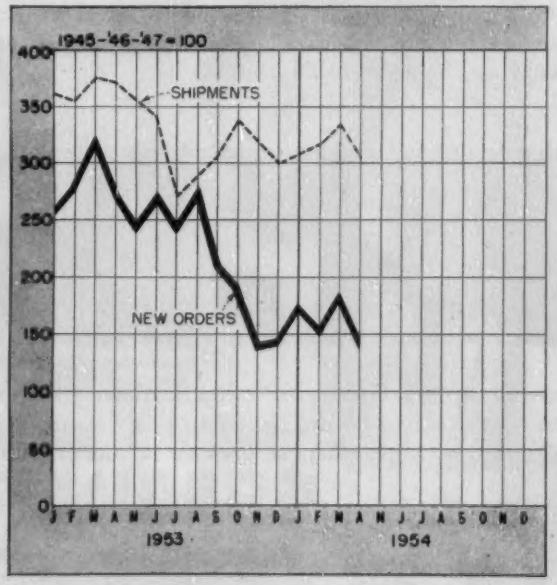
Fourth European Machine Tool Exhibition at Milan, Italy, September 14-23, will have more space devoted to stands than any previous European show, even Hanover in 1952.

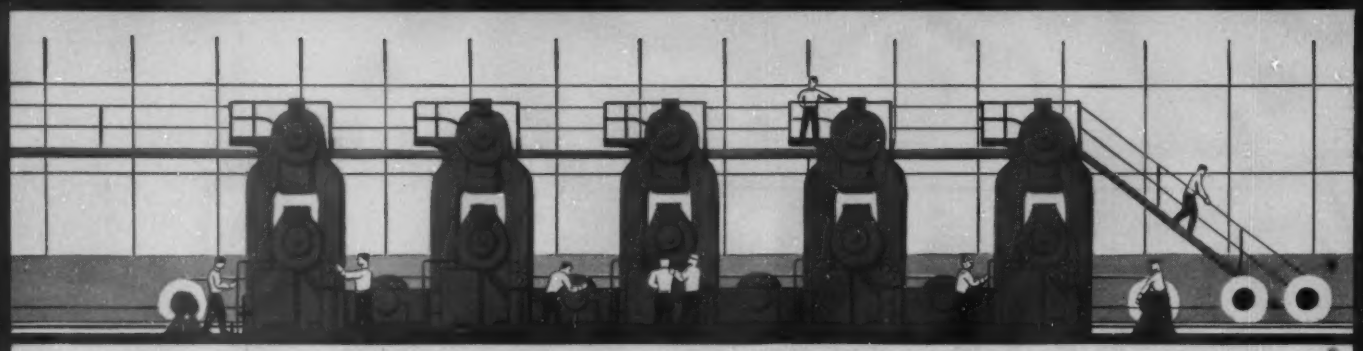
Exhibitors had reserved, at the latest count, some 400,000 sq ft of space.

Germany again will have more exhibitors and will occupy more space than anybody else. Some 285 German builders will show in about 170,000 sq ft of stands. Italian builders come next, with 201 exhibitors taking around 93,000 sq ft.

BF

MACHINE TOOL INDEX
(1945-47 — 100)
(Source: National Machine Tool Builders' Assn.)





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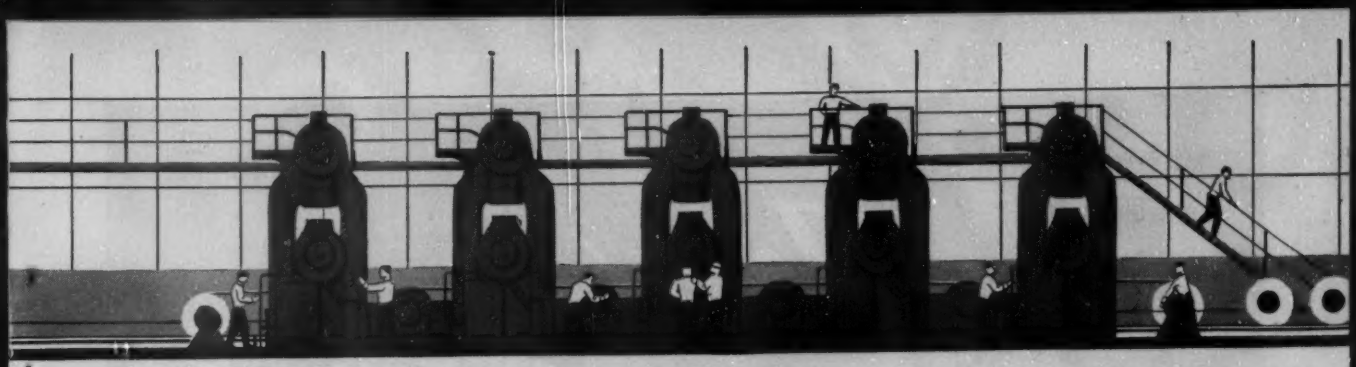

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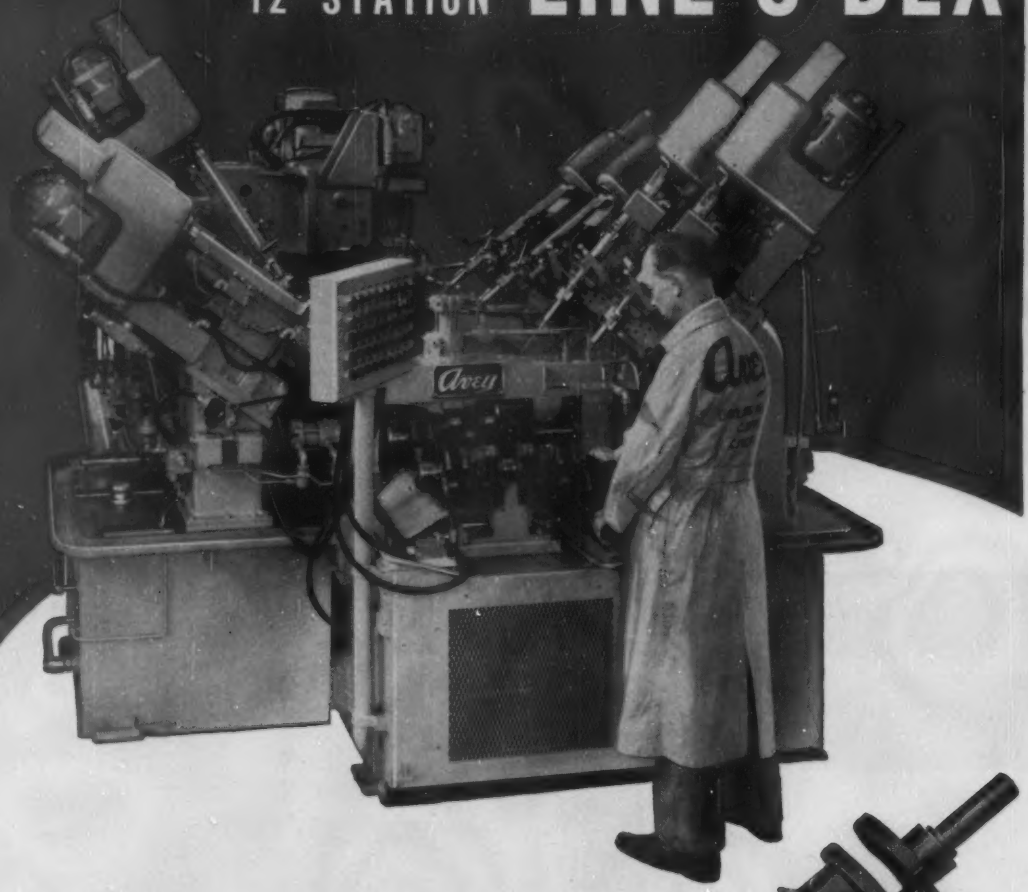

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Gaging Metalworking . . .

PRODUCTION INDEX

BASED ON MANHOURS WORKED IN THE FIVE COMPONENTS

	MAY '54(*)	APR '54(p)	MAR '54(r)	APR '53
Tot. Index...	**143**	**147**	**147**	**169**
Machinery	**125**	**126**	**147**
Electrical Machinery	**166**	**163**	**195**
Autos	**121**	**116**	**135**
Other Transportation	**267**	**267**	**286**
Other Metalworking	**122**	**123**	**141**

(*) Estimated (p) preliminary (r) revised

Metalworking operations may give ground a bit more before they come to rest on a plateau.

The second quarter is proving very good, better than dire predictions made early in the year.

But there is no denying the fact that production in most lines still is outstripping sales.

The drive to reduce inventories continues, though it has mostly spent itself. One good guess is that the shaking-down is about 75% completed.

• • •

American Machinist Index of Metalworking Production is estimated at 143 for May (see chart). That represents a drop of 4 points from April.

Don't overlook the significance of exactly where the index figure is—almost one-and-a-half times the 1947-1949 average.

The post-Korean peak in the summer of 1953 was 171. The decline since then has amounted to 28 points.

• • •

Steel is looking up. Volume of orders booked by one major producer has increased recently and has run through the company's entire list of products. None of this buying is attributed to fear of a steel strike.

Another big steel maker believes that the corner has been turned and that a much firmer market will develop in the second half of the year.

Larger-size pipe has been moving well, and now sheet is in better demand, along with bar stock.

Wire and wire products show considerable gains. One mill looks for enough improvement the next two quarters to pull the year's total up to 10-15% under last year.

One surprise development is the prediction of wire mills that farm business will hold up during the summer. A leading steel company reports tin plate, structure shapes and heavy plate making a good showing.

• • •

Consumers-goods industries are not doing so well. No need telling in detail about the much-publicized situation in the automobile industry, with Ford and General Motors going all out and the rest of the industry in a depressed state.

Household appliance sales are scarcely reassuring. Household washers were off 16% in April from the March level. Dryer sales were down 31%.

One maker of heavy appliances, typical of the industry, reports sales running lower than anticipated. Retailers have been buying hand-to-mouth for months. And now wholesalers are out to cut their stocks some more.

Sales still are not much more than 10% behind last year, despite these adverse factors. Production too is off about 10% from a year ago.

• • •

Capital-goods makers are doing all right in some lines, but not so well in others.

Production is zooming along at many machinery builders' plants, but this pleasant state of affairs cannot continue indefinitely unless more orders roll in.

• • •

Sharp cutbacks in defense production have had a disconcerting effect upon some metalworking firms. Armament output in numerous instances is around one-half the rate of a year ago.

Subcontractors have felt the pinch the most. Prime contractors have been inclined to draw work back into their plants when contracts have been pared.

Gaging Business . . .

PRICE INDEX

	MAY '54(*)	APR '54(p)	MAR '54(r)	APR '53
Total Index	**132.6**	**132.6**	**132.8**	**129.9**
Metalworking Machinery	**141.6**	**142.0**	**138.6**	
Other Machinery exc. Electrical	**137.5**	**137.6**	**133.8**	
Electrical Machinery	**131.7**	**132.0**	**126.3**	
Fabricated Metal Products	**128.8**	**129.0**	**127.3**	

(*) Estimated (p) preliminary (r) revised

Brightest star on the economic horizon is the current high rate of construction activity.

April set new construction records, and to date, expenditures have run over $10 billion—slightly above 1953 totals for the period.

While housing starts are close to 1953 levels, the number of starts financed by public funds have dropped considerably.

Housing starts during the first five months of 1954 totaled about 450,000—5% under 1953's 475,000 starts.

• • •

Manufacturing employment continued to drop in April, with 250,000 fewer people being employed than in March. And 150,000 of these were in durable goods industries, mostly in the metals and metal products industries.

Non-durable goods industries' employment dropped off 100,000 during the same period, but this is the usual thing between March and April. The big employment decline in this field centered in the garment industry.

Factory workweek average was cut back another half hour in April, to 39 hours—the lowest for April in the last five years, and nearly two hours under the April 1953 figure.

Nevertheless, many industries continue to work a 40-hour week: ordnance, machinery, transportation equipment, food, paper, chemicals, petroleum, stone, clay and glass.

• • •

Hourly earnings held their stable pattern in April with factory workers making $1.80 an hour including overtime and premium pay. Average pay this year is 5% higher, but the average workweek is shorter than in 1953.

• • •

Outlook for the months ahead is not particularly bright. The hoped-for turn in business activity has not yet appeared. And conditions could get worse before they get better.

Although May's industrial production indicates the down-trend has been halted, economists say this could be the lull before another decline.

WEEKLY BUSINESS INDICATORS

	Latest Week	Preceding Week	Year Ago
Business Week Index of Activity (1947-49 = 100)*	124.7	124.4	132.9
Steel ingot production (thousand tons)	1,680	1,712	2,262
Electric power output (million Kilowatt hours)	8,373	8,380	8,013
Production of automobiles and trucks	157,984	153,796	162,447
Engineering construction awards (*Eng. News-Record*, millions)	$288.5	$330.4	$291.3

MONTHLY BUSINESS INDICATORS

	Latest Month	Preceding Month	Year Ago
Refrigerators sales (thousands of units)	331	334	378
Vacuum cleaners sales (thousands of units)	221	199	246
Washers sales (thousands of units)	308	295	327
Household electric ranges sales (thousands of units)	115	110	114
Radio production (thousands of units)	940	769	114
Television production (thousands of units)	600	427	731
Gear sales index (1947-49 = 100)	128.6	165.1	188.1
Foundry equipment new orders index (shipments, 1947-49 = 100)	82.7	99.9	257.3

* Seasonally adjusted.

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Because of the high ductility of the steel base and the remarkable adherence of the zinc coating, you can cold-work Armco ZINCGRIP Tubing to practically the same extent as cold-rolled tubing. Moreover, it is supplied in many special shapes.

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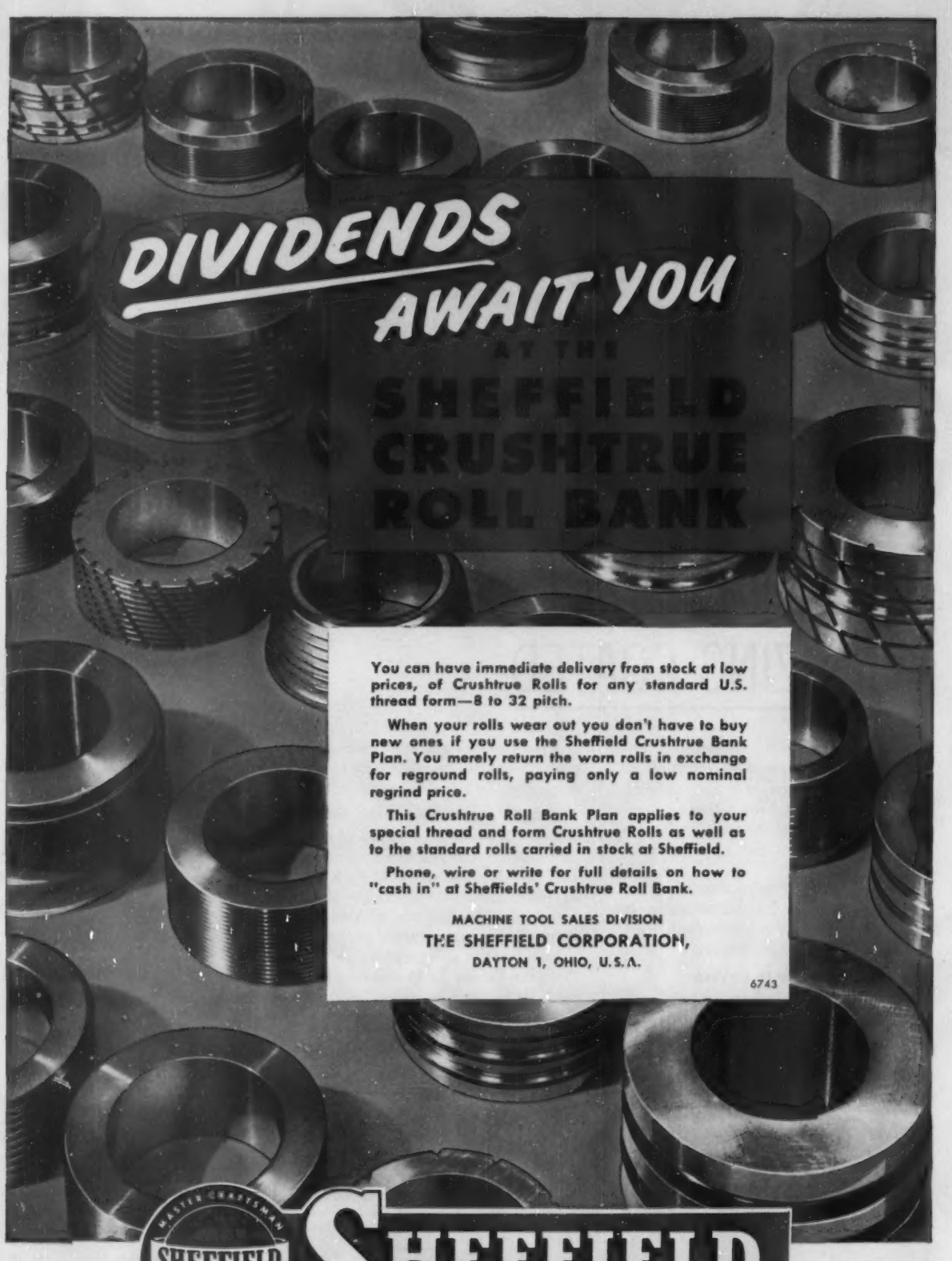

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American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

Our "Enlightened" Tax Policy

Britain has often been cited as a nation marching down the road to economic stagnation.

Today, Britishers recognize the peril. They are putting more horsepower at the disposal of the individual worker and thereby are raising his productivity and his purchasing power.

To stimulate mechanization, Britain has inserted in its 1954-1955 budget a new inducement. It is called an "investment allowance."

A British manufacturer, by using his "investment allowance," will pay $5,430 for a $6,000 machine. He thus will get special tax relief of 9½%. That is on top of a normal depreciation rate of 10% a year, figured on the declining-balance principle.

This is not the first time that the "backward" British have offered tax incentives to their industries to invest in new plant and equipment. They did it right after World War II with good results. Now they are doing it again.

The Dutch make the British look like pikers, though. A manufacturer in The Netherlands investing in new machinery may deduct one-third of its cost from his taxable income as soon as the money is paid out. He then may write off an additional 4% a year in each of the first five years.

These special deductions, mind you, are "extras" over and beyond the normal depreciation allowance of 10% a year.

Holland is doing a flourishing business in industrializing its country as a result of these practical incentives. It is attracting many foreign metalworking companies, including US manufacturers, to its shores.

Britain and The Netherlands are not alone in recognizing the merit in enabling management to recover quickly the capital that it has invested in new plant and equipment. Switzerland, France, and Sweden have comparable depreciation and tax-inducement measures in force.

Our "enlightened" country — champion of top wages, high priest of productivity, crusader for the policy of constantly increasing purchasing power as the key to economic strength and prosperity — is notably missing from the ranks.

What we possess is a backward tax depreciation policy. It would do credit to the mythical kingdom of Ruritania. But not to the United States.

The truth is that our Treasury Department has not progressed much beyond the depression days of 1934 in its application of tax-depreciation policy. The unrealistic and benighted standards in the Internal Revenue Service's Bulletin F still apply.

We are told that better days are ahead. As a first step, the Treasury has liberalized a few of its rules. Beyond that, the new tax bill provides for a quickening of the write-off period. You will be able to depreciate your new equipment in two-thirds the time cycle that has applied heretofore.

The new tax bill admittedly represents a fine beginning toward correction of a grossly inequitable depreciation policy. The main fault with it is that it does not go far enough. The new schedules touch the periphery but do not get at the heart of the problem.

Optional depreciation — permitting the manufacturer to choose his own rates — is the real solution. But one must face the reality that Congress is not yet prepared to go that far.

Short of that, some sort of compromise between the present bill's provisions and optional depreciation would be a wise course of action. It might be the use of the sum-of-the-digits method that permits, if the taxpayer chooses, much faster write-offs than the new tax bill provides.

The point is that unless we go farther than Congress now proposes, we still will be in the awkward position of an "enlightened" nation that is far behind "backward" countries in its plant and equipment.

More important than that, we run the peril of discouraging replacement of old equipment with new at a time when obsolescence in metalworking machinery is at an all-time peak.

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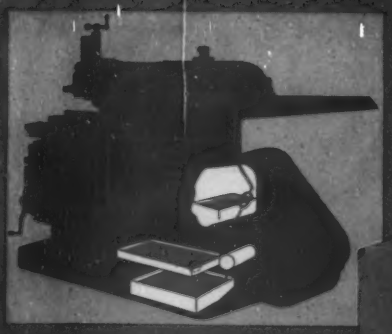

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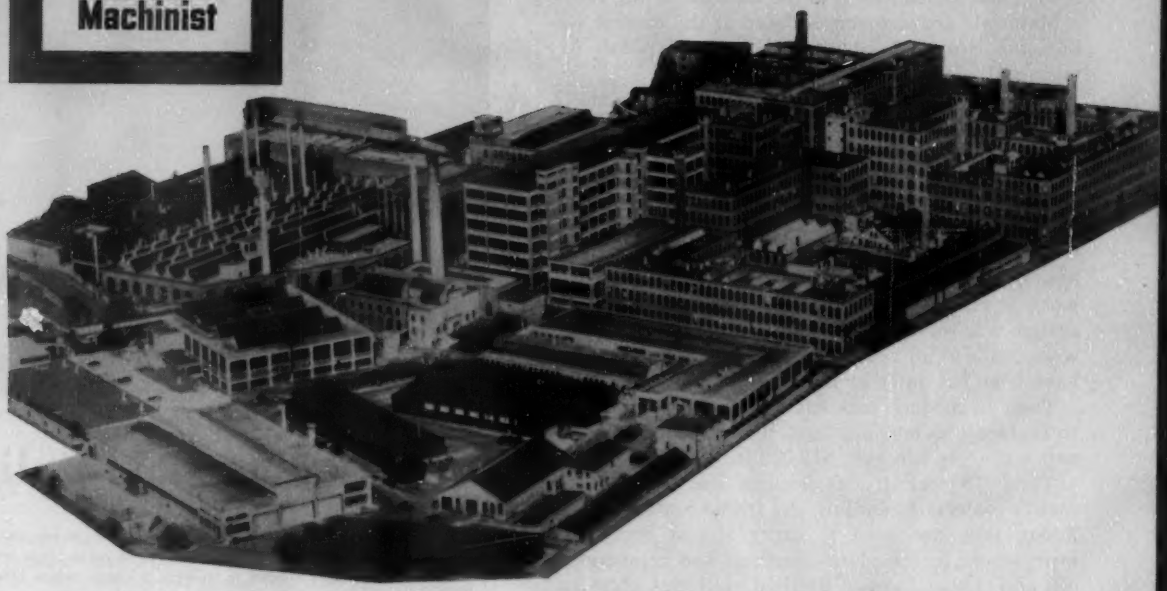
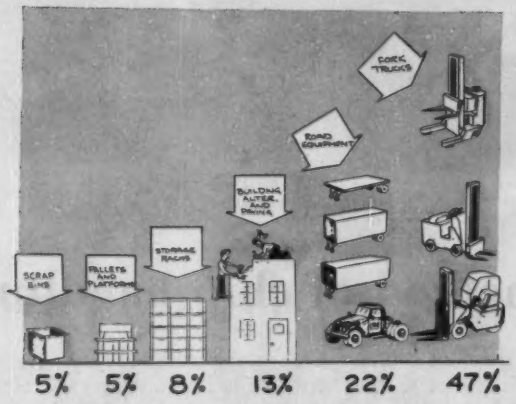


New wrinkles for an old plant...

A multi-story, multi-building plant producing a wide variety of machine tools and instruments presents some pretty knotty problems in plant traffic and materials handling. Here's how Brown & Sharpe solved them

ROBERT SHEETS, associate editor



How the money was spent . . .

Spread over several acres in the heart of downtown Providence, RI, with city streets running between its 25 buildings, is the 121-year-old Brown & Sharpe Mfg Co, maker of milling and grinding machines, screw machines and precision tools.

Manufacturing operations cover 43 acres of floor space in several buildings ranging from one to six stories high. Most of the shops are 30-40 years old. One end of the plant is on flat ground. The other is on a 7% grade. Put all these factors together and you have a first-class headache for any materials handling or plant traffic engineer.

Two years ago, congestion reached the point at which Brown & Sharpe called in a specialist, J Gilbert Dresser of Dresser Engineering, Inc, gave him the green light to unravel the tangle. The plant's top engineers and operating men were called in to help with the revamping job, which concentrates not on rearrangement of departments and new construction, but rather on installation of faster materials handling and better utilization of floor space.

For instance, a central transfer station was set up, where unit loads are made up on pallets for delivery to outlying shops and sheds. But before the loads reach the central station, they are first consolidated in each building, then brought to the central station by hand-truck operators, who put down their loads

in areas designated for each destination. The truck operator then picks up a load for his building, takes it back and distributes it to the manufacturing floors.

Materials are also consolidated at the central station for Brown & Sharpe's Greystone plant, five miles outside Providence.

Elevators presented a tough problem in the multi-story manufacturing buildings. Men with trucks had to wait as much as half-an-hour for one to stop for them. The revamping crew checked size, weight and types of loads, how much time it took to get them from one floor to another, and the like. Traffic plans were made, showing sources of heaviest loads, rush hours, and which elevators were getting the least work at certain times. From these data, the present system was solved, whereby elevators carry uniform work loads at all hours, and long waits for elevators have been cut down or eliminated.

Then 18 modern fork lift trucks were brought in to replace obsolete platform trucks, whose maintenance charges ran over $19,000 in 1952 alone.

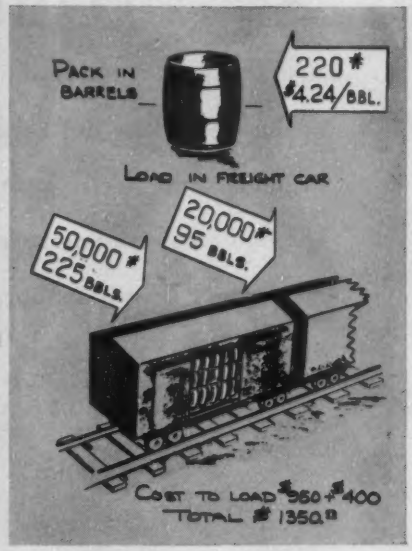
These 18 fork trucks became the heart of the plant's materials handling and traffic control system. Today they are used to carry almost everything everywhere in the plant—castings and components, oils and sludge, lumber, finished machines, chips and trash.

Rotating-head fork trucks have been instrumental

Fork trucks simplify

THE PROBLEM: Heavy castings, such as beds for screw machines, were stacked in the foundry yard. In order to move them into the plant, three men were needed to operate a crane, which lifted the castings from the pile and onto fork-truck platform. Because of the size and weight of the castings, the operation was frequently dangerous

CHIP DISPOSAL WAS A BACKBREAKING JOB AND A COSTLY ONE, involving plenty of hand trucking and muscle power. Barrels were unwieldy, expensive



OLD METHOD cost $1350 to load and ship 70,000 lb of chips

New method of chip handling

Biggest single saving in Brown & Sharpe's revamped handling was effected in disposal of HSS chips. Under the old method, chips were put in bins at the machines, then carried by platform trucks to the centrifuge room, where they were packed in burlap-topped barrels. Chips were trucked to storage, then trucked to the railway yard, where they were hand-loaded, 225 barrels to a 50,000-lb-capacity closed

heavy parts handling

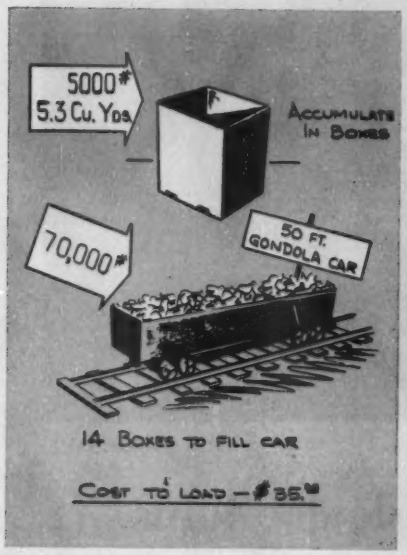
THE SOLUTION: Castings are palletized in the foundry. A fork truck with hydraulic lift picks them up, moves them to storage yard and stacks them. When castings are needed, fork truck picks up loaded pallet, rides up in elevator to desired manufacturing floor, deposits castings exactly where needed. Operation removes hazardous work of guiding crane

in effecting the largest savings in plant handling operations. One 12,000-lb-capacity rotary-head fork truck picks up trash in 6 x 6 x 6-ft steel boxes at various points, takes them to two 30-cu-yd dump trailers to be hauled to a dump five miles away. With this system, only two trips are made a day. Formerly, a 5 cu-yd truck made 12 or more trips a day. The 12,000-lb, rotary-head truck is also used in slag and chip disposal, and handling of machinery and lumber. A smaller, 2000-lb rotary-head truck distributes cutting and lubricating oils throughout the plant, carries away sludge.

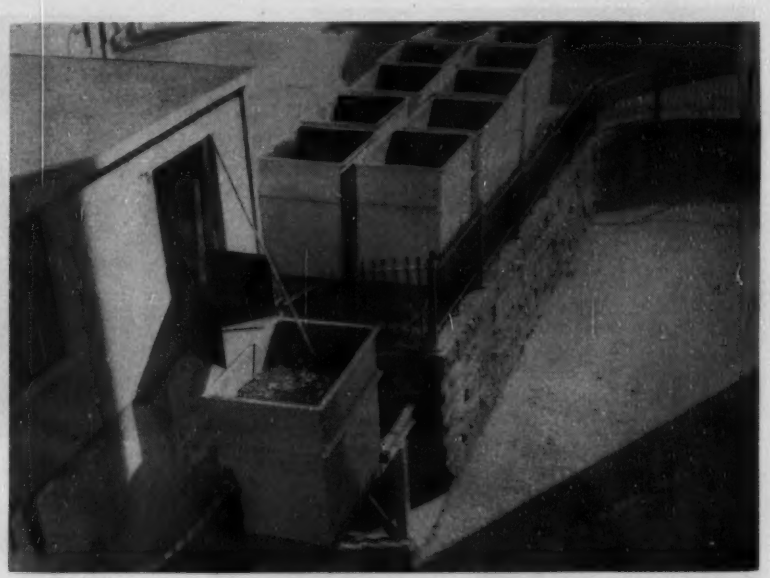
Other fork trucks operate on each floor and between floors, carrying small parts, castings, heavy machines and components. In lumber handling alone, Brown & Sharpe saves $35,000 a year by using fork trucks in place of hand loading. At the shipping dock, one fork truck has replaced a cab crane in 70% of all truck-loading operations.

And there have been other changes, too. Neat two-high and three-high storage racks are everywhere, replacing the piles of materials and parts that narrowed aisles and congested traffic.

Today—two years and upwards of $200,000 later—plant traffic is running smoothly at Brown & Sharpe through uncluttered aisles. And materials handling costs are dropping so fast that the investment will pay for itself two years from now.



NEW METHOD loads and ships 70,000 lb of chips for only $35



TODAY, CHIP DISPOSAL INVOLVES A MINIMUM OF WORK, is accomplished economically and efficiently by using fork trucks and tote boxes

saves $1315 per carload

freight car . . . Under the revised method, chips are accumulated in 5.3 cu-yd metal bins at the centrifuge room, where they are picked up by a rotating-head fork truck, and carried to a central collecting point. When 14 bins have accumulated, a fork truck carries them to a 50-ft railway gondola car, lifts the bin and tilts its contents into the car. Cost of loading 70,000 lb is $35 instead of $1350.

Rotating-head fork truck speeds oil handling

THE PROBLEM: Thousands of gallons of lubricating and cutting oils, used annually by Brown & Sharpe, had to be handled in 50-gallon drums, which were wrestled manually onto platform trucks, pulled to the various floors, tilted by hand into containers. Reverse process applied to sludge disposal

THE SOLUTION: 2000-lb-capacity rotating-head clamp fork truck picks up barrels of oil, delivers them to machining floors, places them on racks or tilts oil into container. Sludge is picked up in barrels, carried outside to stationary containers, which are carried by fork truck to road truck for disposal

Simple device joins 3-floor conveyor line

THE PROBLEM: Brown & Sharpe's screw-machine-building line is located on three floors. While the line was fully conveyorized on each floor, it was necessary to move the heavy screw machines and parts from the end of each floor's conveyor by hand platform truck into the elevator and onto the next floor's conveyor line. Operation was laborious, and production of screw machines was frequently delayed because building and conveyor arrangement wouldn't permit use of reciprocating hoist

THE SOLUTION: Plant Engineer Frank Dzaman and Transportation Foreman William Church came up with this idea: They took a section of roller conveyor and affixed it to a straddle-type fork truck equipped with power traction and a power lift. Now, when a machine reaches the end of a conveyor line, the fork is butted to the end of the line, its roller-conveyor platform is lowered and locked to the end of the conveyor, and the machine slides onto it easily. Fork truck then travels by elevator to next floor, loads machine on next conveyor

Elbow room for the welding shop

THE PROBLEM: Brown & Sharpe's metal fabrication section, a square, two-story room, was continually cluttered with formed parts piled along the walls and in the center of the room. Narrowed aisles made it almost impossible for trucks to move quickly and easily

THE SOLUTION: Racks were installed along the walls to store formed parts and finished weldments awaiting shipment to other departments. All incoming and outgoing parts were palletized for pickup by fork trucks. Shipping areas were definitely marked off

Easy-to-assemble racks . . .

bring order . . .

One man can assemble storage racks

BROWN & SHARPE-DEVISED STORAGE RACKS (shown above) can be put together by one man, require no bolts or fasteners. Now, racks can quickly be put up anywhere in the plant to meet congested storage problems and clear the aisles. B & S has found that racks with 30-in. opening, 96 in. wide and 48 in. deep are most practical. Where ceiling heights permit, racks are three-high, three-to-a-row. Racks have movable channels to allow use of "mongrel-size" platforms. Bins (platforms with movable sections) are also used. They allow storage of as many as six different kinds of small parts in one box, and can be stacked

. . . out of confusion

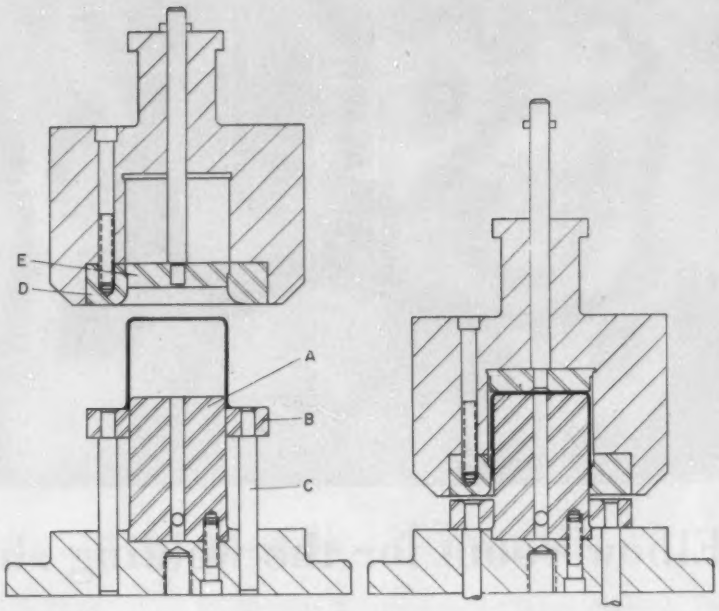


FIG. 1 . . . To produce a straight, smooth article, a shell with an inside diameter from 0.010 to 0.015 in. oversize is placed on stripper *B* and over the punch. When the die descends, it irons the walls of the shell against the punch

Cope Talks on Draw Dies...XIII

Iron shells to get accurate diameters or

To obtain the ironing effect, you must reduce the clearance, and you can't expect to achieve as much diameter reduction as in routine drawing

When a round shell is drawn from a flat blank, or is being reduced in diameter, and proper clearance is used between punch and die, the metal thickness increases slightly near the open end. In effect, the shell OD is made slightly tapered — the wall thickness being a maximum at the open end and a minimum at the bottom, where the thickness may be 10 to 15% less than that of the original metal thickness. Thickening of the shell at the open end is caused by resistance of the metal in the blank, or in the walls of a shell being reduced, to compress into smaller areas as the operation proceeds.

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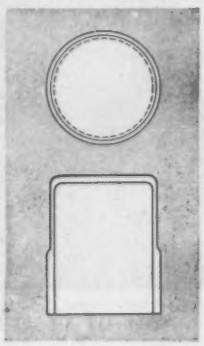


FIG. 2 ... For a shell of non-uniform wall thickness, the blank dia $D = 1.128 \sqrt{V \div t}$, where V is the sum of the volumes of the various sections, and t is the bottom thickness

A variation in wall thickness is not objectionable for many types of shells, especially those with diameters dimensioned in fractions. But shells that must have reasonably straight and uniform walls are drawn with metal-to-metal clearance in the final operation. This practice partially corrects the thickness variation and produces a smoother surface.

When a shell must be drawn to an accurate diameter, and to a dead smooth finish, use stock that is one or two gage numbers heavier than the thickness of the wall of the finished shell. This permits ironing, or thinning, of the metal. For example, if the wall is to be 0.033 in. thick, the stock should be of No. 20 ga. (0.036 in.) so that it can be reduced in thickness when drawn.

Wall thickness of any shell is found by the formula:

$$t_1 = t \sqrt{D/d_1}$$

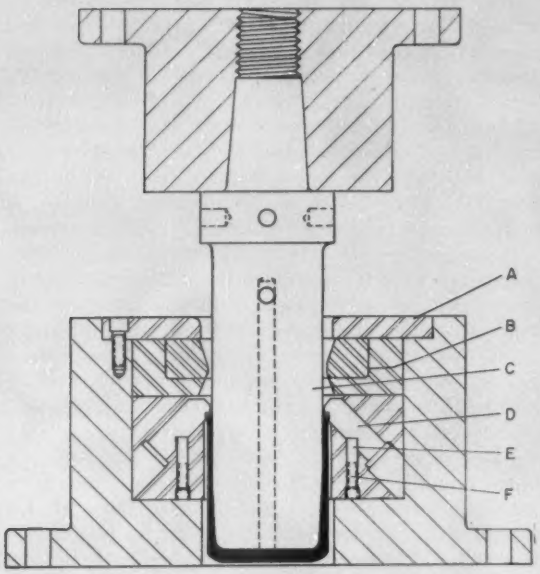


FIG. 3 ... Stripping fingers *D* are pushed outward as the punch pushes the shell through the ironing die, but then they snap inward and over the open end of the shell to strip it as the punch rises

smooth finish

STANLEY R COPE, president,
ACME SCHOOL OF DIE DESIGN ENGINEERING,
SOUTH BEND 1, INDIANA

Where

t = stock thickness D = blank diameter
t_1 = shell thickness d_1 = shell diameter

To produce the desired ironing effect, the space between punch and die must be somewhat less than the thickness of stock. In other words, the punch diameter should be 0.004 to 0.008 in. greater than the dimension obtained by subtracting twice the stock thickness from the die diameter.

IRONING MAY NOT BE NEEDED

In many cases the dies are made so that no ironing occurs until the last drawing operation. If then the walls of the shell are thinned from 0.001 to 0.003 in., no ironing is done unless required.

When it is necessary to reduce the thickness of the metal more than the amount specified, the shell should first be drawn with an inside diameter 0.010 to 0.015 in. larger than the finished shell, and then sized in a separate die.

Even when metal is to be reduced in thickness by only a few thousands during drawing, the diameter reduction in turn must be appreciably reduced, because ironing adds considerably to punch pressure against the bottom of the shell. It may be necessary to halve the diameter reduction. Example: if it is practical to make a 20% diameter reduction with proper clearance between punch and die, the same shell can be reduced only 10 to 15% if no clearance is allowed and the metal thickness is reduced by ironing.

Drawing and redrawing dies designed to iron the metal slightly do not differ from ordinary dies except that they should be somewhat stronger. Also they should be operated in slower presses.

DESIGN OF SIZING DIES

When it is necessary to size a shell in a separate die, the shell ID should first be drawn from 0.010 to 0.015 in. oversize as previously stated. Next, the shell is placed in a die similar to that shown in Fig. 1 in open and closed views. The shell is located over punch *A* and rests on stripping ring *B*, which is normally held in a raised position, ¼ to ⅜ in. below the top of the punch, by pins *C*. These pins are actuated by a pull-up attachment.

When the slide descends, ring *B* moves down and allows the shell to drop down over punch *A*. With the shell in this position, die *D* descends and irons the walls of the shell against the punch, thus producing a straight, smooth finished shell. Knockout plate *E* strikes the bottom of the shell at the end of the stroke, thus making it flat and square with the side walls.

In this particular die the bottom radius of the shell is also reduced in size. When the slide ascends, if the shell rises with die *D*, it is ejected by the positive knockout. It it sticks to the punch it is stripped from that member by the stripping ring *B*.

EXTRA-HEAVY DIE DETAILS

Sizing-die details should be made extra heavy, and should be mounted on steel punch and die holders with extra large screws. Considerable force is needed to pull a sizing punch from its die. The ironed shell is practically a press fit between the two surfaces. If precautions are not taken it will be difficult to hold the die in the press. The members of the die set should be screwed directly to the bolster plate and the slide of the press, and not merely held in position by clamps. If you do not wish to screw the punch holder to the slide, a punch shank with a special head may be provided as shown. The head fits into a special recess in the press slide, and prevents the shank from being pulled out of the hole when the slide rises.

The body of the punch and the die hole of a sizing die should be lapped in a lengthwise direction to a very smooth finish. In addition, the drawing or ironing radius *R* should be as large as possible to allow the metal to roll ahead with a minimum of friction, thus preventing straining and stretching it.

IRONING

When a shell is reduced more than a few thousandths, the operation is referred to as "ironing" instead of sizing, but the action of dies for performing both

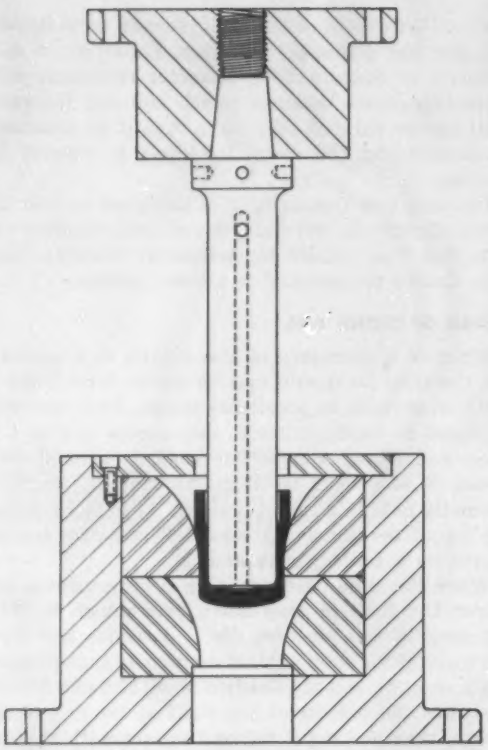


FIG. 4 . . . Most die wear occurs in the first step (upper die ring) where the shell is ironed. Second step (lower die ring) sizes the shell

operations is essentially the same. Shells may be ironed to obtain:

1. Very accurate diameters
2. A dead-smooth finish
3. Thin-walled shells with thick bottoms
4. Stepped, or tapered, walls of non-uniform thickness

Brass, steel, aluminum, and certain other metals can be ironed successfully. All operations are performed without heating the metal, except in a few cases where steel shells are to be produced. Heating of certain types of steels is necessary, because of high tensile strength and resistance to plastic deformation. At one time, stainless steels and similar materials could not be ironed successfully, because there was a tendency for the metal to flake off and load the die. This situation is no longer true, because of improvements and development of suitable grades.

Brass in the soft temper, 70-30 analysis is most commonly used for ironing operations, especially cartridges and shell cases. With this material the theoretical maximum reduction in wall thickness in one operation is approximately 50%. If this reduction is attained the cross-sectional area of unstrained metal before ironing is about double the cross-sectional area after ironing. Therefore, the area being worked in compression, *and which must yield,* is about equal to the strain-hardened area which is in tension, *and which must not yield.* Because of this relationship, the practical limit for reduction is below 50%, although slightly higher reductions have been made.

The usual reduction in wall thickness for ironing brass shells varies from 35 to 45% for each operation. This is preceded, in the same operation, by a small reduction in diameter from 1 to 8%, in order to permit the ironing punch to enter the shell freely.

BLANK DIAMETERS FOR IRONED SHELLS

The approximate blank diameters for ironed shells are found by computing the volume of metal in the shell and then finding the blank diameter that contains the same amount of metal. The graphical method for finding blank diameters cannot be used, because the metal is not of uniform thickness throughout the shell's cross-section.

Blank diameters for plain shells where the side walls of a shell are ironed to a uniform thickness

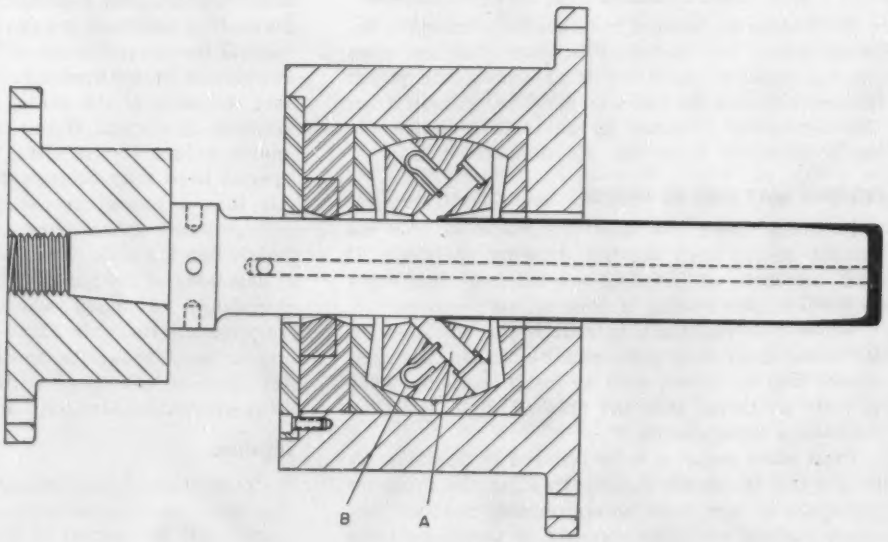


FIG. 5 . . . Extremely long shells are ironed in horizontal dies. Open end of shell is likely to be uneven. Hence, stripper pins are mounted in a spherical bearing that allows the pins to adjust themselves to the shell edge

which is thinner than the bottom can be found by this formula:

$$D = \sqrt{a^2 + (a^2 - b^2)\frac{h}{t}}$$

Where:

D = blank diameter
a = outside diameter
b = inside diameter
t = thickness at bottom of shell
h = height

When the walls of a shell are not of uniform thickness, Fig. 2, the shell must be divided into sections and the volume of each section must be computed separately. To find the area of the blank the sum of the volumes of all the sections is divided by the thickness of the blank (the blank and the bottom of the shell are usually of the same thickness). The square root of the area of the blank is then found and is multiplied by 1.128 to find the diameter of the blank.

DESIGN OF IRONING DIES

Shells are ironed in ordinary push-through dies equipped with one or two ironing rings and special stripping fingers similar to those shown in Figs. 3 and 4. Extra-long shells are ironed in horizontal reducing presses in dies of the type shown in Fig. 5.

The operation of die shown in Fig. 3 is as follows: The shell is located in ring *A* and rests on top of cemented-carbide die *B*. Carbide inserts are usually employed for ironing operations because of their superior wearing qualities. When punch *C* descends, it enters the shell and reduces the thickness of the walls by forcing the shell through the die. At the same time it reduces the inside diameter of the shell, which has been drawn slightly oversize in the preceding operation to allow the ironing punch to enter freely.

As the shell passes through the die it contacts the angular tops of stripping fingers *D* and pushes them out of the way. Fingers *D* are inclined, and are actuated by pins *E* and springs *F*. When the shell has passed through the die the fingers snap over the top edge of the shell and prevent it from rising when the punch returns to its up position. The shape of the mouth of the die is very important.

TWO-STEP DIES

Two-step dies, as shown in Fig. 4, are frequently used to hold the shell to accurate size by localizing the principal wear on the first step. The shell is ironed in the first step and is sized in the second step. Even though two rings are used, the total reduction in diameter should not exceed that which is possible with a single-step die (35 to 45%).

Horizontal-type dies, Fig. 5, work on the same principle as that described for vertical-type dies, except that a special stripper is necessary, because of the length of the shell. Stripper pins *A*, which are actuated by springs *B*, are mounted in a holder having a spherical bearing, so that it can be moved

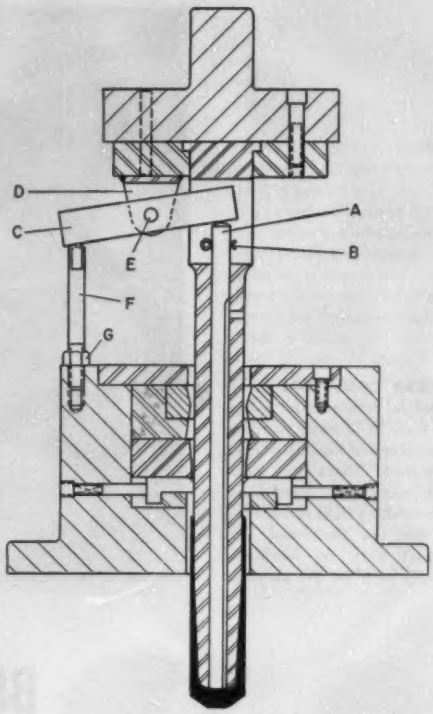


FIG. 6 ... When the ironed shell is prone to stick to the punch, use a knockout actuated by a rocker arm pivoted on the punch holder

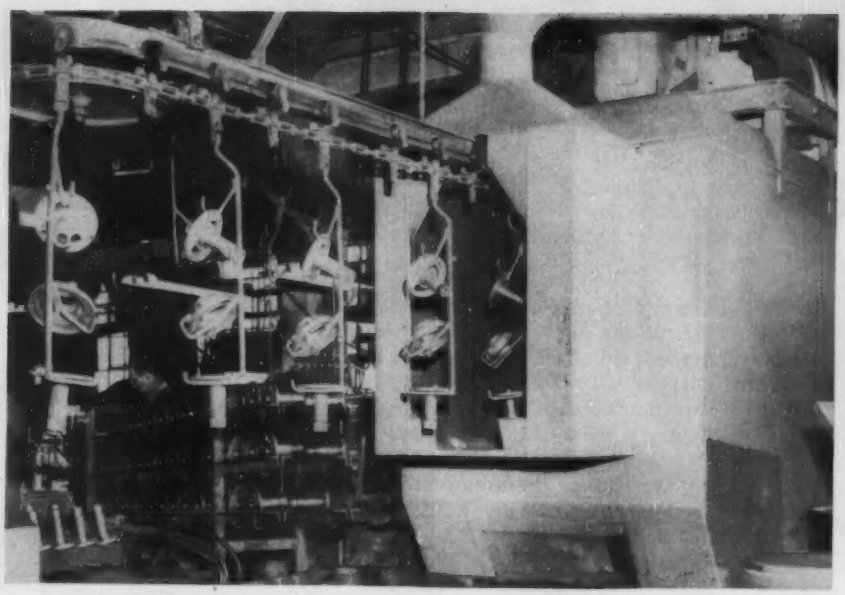
in any direction. With this universal movement, the pins automatically adjust themselves in any position as required by any unevenness in the edge of the shell. With this arrangement practically uniform pressure is exerted upon the shell when it is stripped from the punch.

SPECIAL STRIPPER

The die shown in Fig. 6 is equipped with a special stripping device in the punch, in addition to regular stripping fingers. This device loosens the shell on the punch by pushing it for a distance ranging from ¼ to ½ in. before the stripping fingers contact. This precaution is often necessary when ironing thin-walled shells that have an uneven top edge. There is a tendency for the inner walls of ironed shells to fit tightly into the small crevices which result from machining and polishing the punch. This will make the shell cling tightly to that member.

The stripping device consists of knockout rod *A*, cotter pin *B*, rocker arm *C*, bracket *D*, fulcrum pin *E*, post *F*, and adjusting nut *G*. When the shell has been ironed, and has passed through the die, the rocker arm contacts the post and forces the knockout rod downward for the desired distance. With the shell loose it can be removed from the punch by the stripping fingers with minimum effort.

Part XIV of Mr. Cope's series will appear in an early number.



OVERHEAD CONVEYORS carry automobile transmission pump parts from a 3-stage washer to inspection and final assembly. Gravity-feed conveyors and special racks also speed materials handling between operations that are performed, for the most part, on machines especially built for the purpose

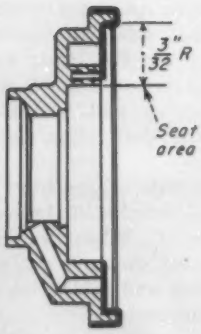
BIG PLANT TOOLING...*in a*

Contract jobbing shops are noted for their ingenuity in meeting production problems. Here's one serving the automotive industry that uses the big-plant approach in tooling up long-run jobs

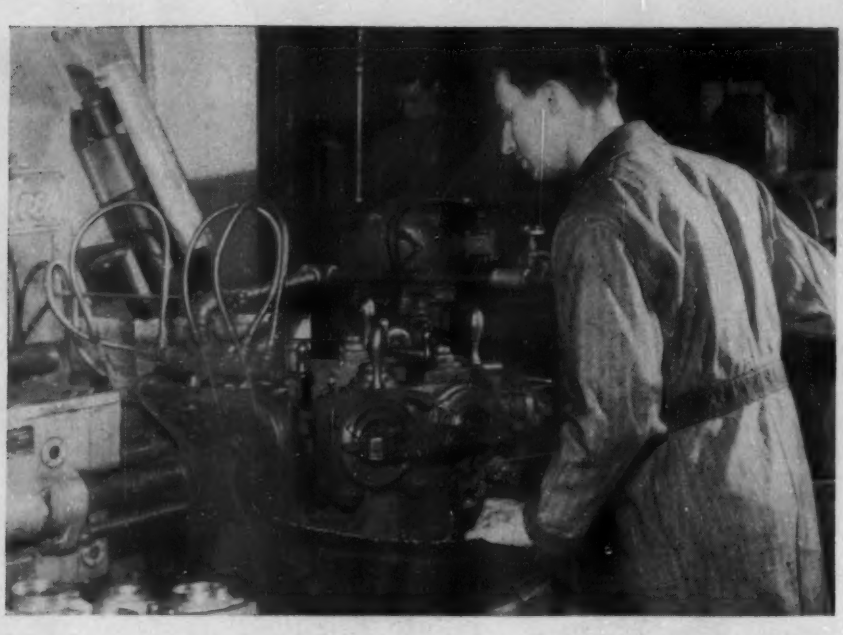
GEORGE H DE GROAT,
associate editor

A large variety of precision parts and assemblies are made for the automotive industry at Federal Industries, Inc, Detroit. To keep costs down in this highly competitive market and to meet demands for a constant flow of high-volume production, this small shop of 250 people has installed special tooling, a quality-control system that insures constant on-the-floor inspection and materials-handling methods that minimize manual labor from the first machining cut on a part to its final packaging.

Consistent accuracy is important,



FLAT TO 0.0004-IN. CONVEX is requirement in facing seat in housing for converter support. Hydraulic cross-slide on 3-spindle Ex-Cell-O does this work after flange OD is finish turned and the 5.625 in. dia is bored and chamfered. Work is held in diaphragm chucks while carbide tools produce 140-mu in. finish at a production rate of about 115 per hour. Parts are transferred in specially built racks

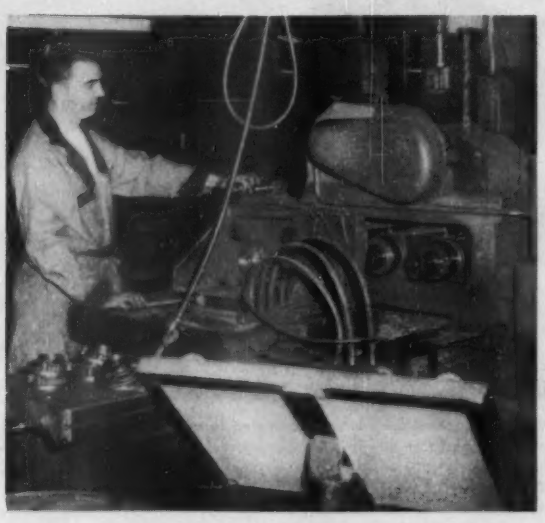


GRAVITY-FEED CONVEYOR CARRIES HOUSING from Bullard to special Avey index drilling machine where housings are drilled, spotfaced, reamed, countersunk and tapped on both sides in two cycles of machine. Combination tools in first cycle produce 4 drilled and spotfaced holes in bosses and an angular head permits drilling a 5/16-in.-dia hole on 25° angle. In second cycle, one of the 21/64-in.-dia holes previously drilled is reamed for locating purposes in subsequent operations, a ⅛-in.-dia hole is drilled at a 65° angle and two holes are drilled, countersunk and tapped. Finished parts are loaded into an inclined ramp for transfer to next machine

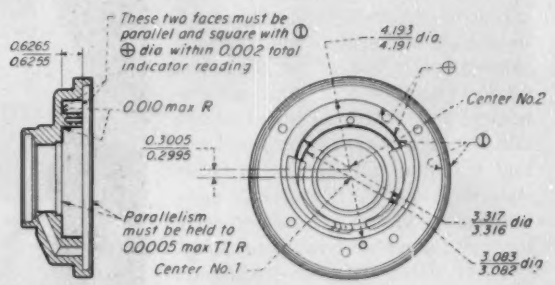
small shop

because many of the parts made here are later assembled with components produced elsewhere. Also, just as many other parts are made and assembled here into complete units. One of these units is an automobile hydraulic transmission pump, which is completely ma-

OVER 35,000 PUMPS per month are made to a consistently high degree of accuracy with tooling designed for mass production. Converter support, left, and housing, right, are mating parts and must seat flat at assembly within 0.0003 in. Driven internal gear and driving spur gear are assembled with end clearance of 0.001 to 0.002 in.



TWO MACHINES, ONE OPERATOR, is the setup for finish boring gear cavities in the pump housing. Center spindle of one of these Ex-Cell-O machines bores and faces the concentric cavity and bores



NOTE:
Diameters marked + are precision bores and must be concentric within 0.002 inches. Total indicator reading and must be parallel with 3.082 dia.

a babbitt bushing previously pressed into the small bore. Outer spindles bore and face the eccentric cavity. Hydraulic clamping fixture holds two pieces at a time, one in the first outer spindle, the other in the center. When these cavities are complete, a special hydraulic cross-slide indexes to carry the part in the center spindle to the third outer spindle for boring the eccentric cavity and the part in the first spindle to the center for boring the concentric cavity

chined, assembled and tested before shipping. Some of the setups employed in producing the pump components are typical.

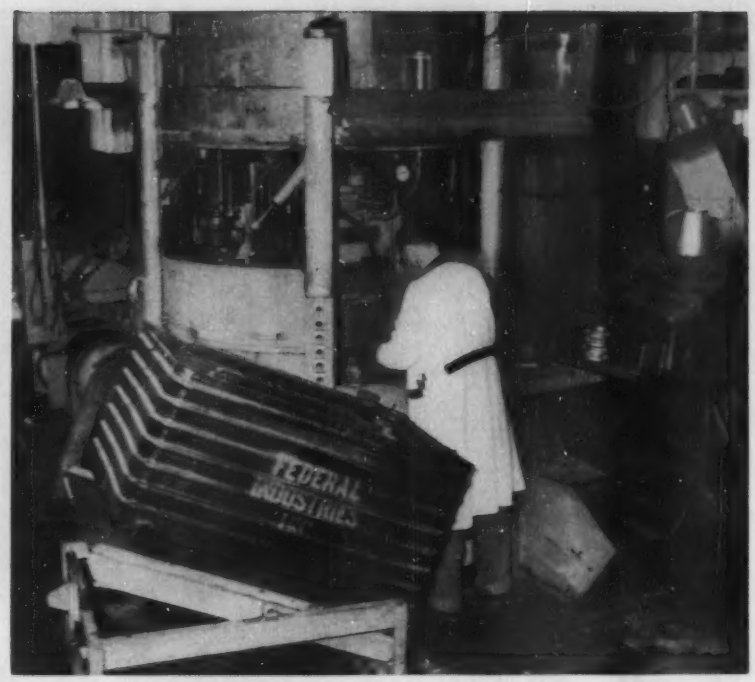
Production on the pump housing, for example, begins at a 12-spindle Bullard Mult-Au-Matic. Castings are delivered to it in a huge workpan which is placed in an inclined cradle at the operator's left to facilitate loading the machine. A gravity-feed roller conveyor at his right carries finished work to a special 5-station Avey drilling machine for the next sequence of operations. From here they go to a 3-spindle Ex-Cell-O boring machine equipped with a special hydraulic cross-slide for facing the work. A gravity-feed conveyor carries finished parts from here to another 3-spindle Ex-Cell-O where concentric and eccentric cavities are bored. One operator runs two of these machines and disposes of finished parts into a rack by means of which they are conveyed to a deburring station.

Here, the cavities and bores of the housings are deburred in a continuously rotating, 12-table American Wheelabrator machine, then the parts are loaded on an overhead conveyor that carries them through a 3-stage washer and from there to final inspection and assembly.

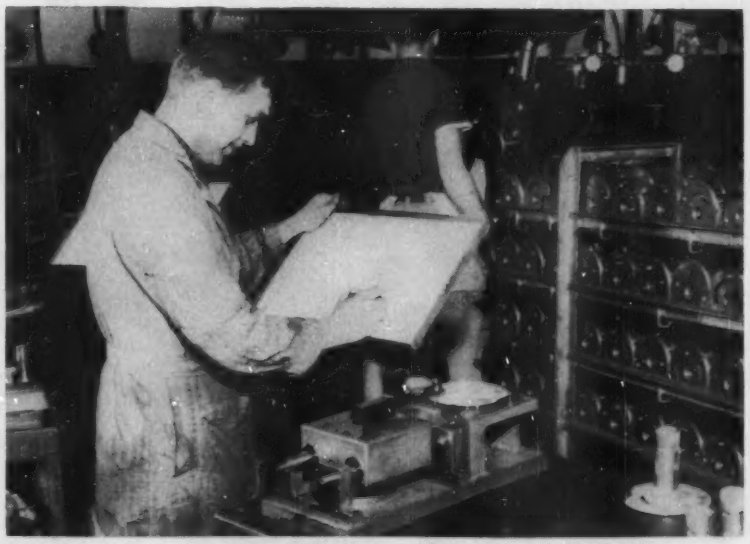
CRITICAL DIMENSIONS CHARTED

At each operation in this line, as well as the others, floor inspectors run sample checks and chart the trend of critical dimensions. All important dimensions and relationships are checked as the parts are made. This not only aids quality control but serves as an excellent check on tool wear, setup accuracy, and machine conditions. To facilitate this work, floorstands containing the charts are strategically located throughout machine lines.

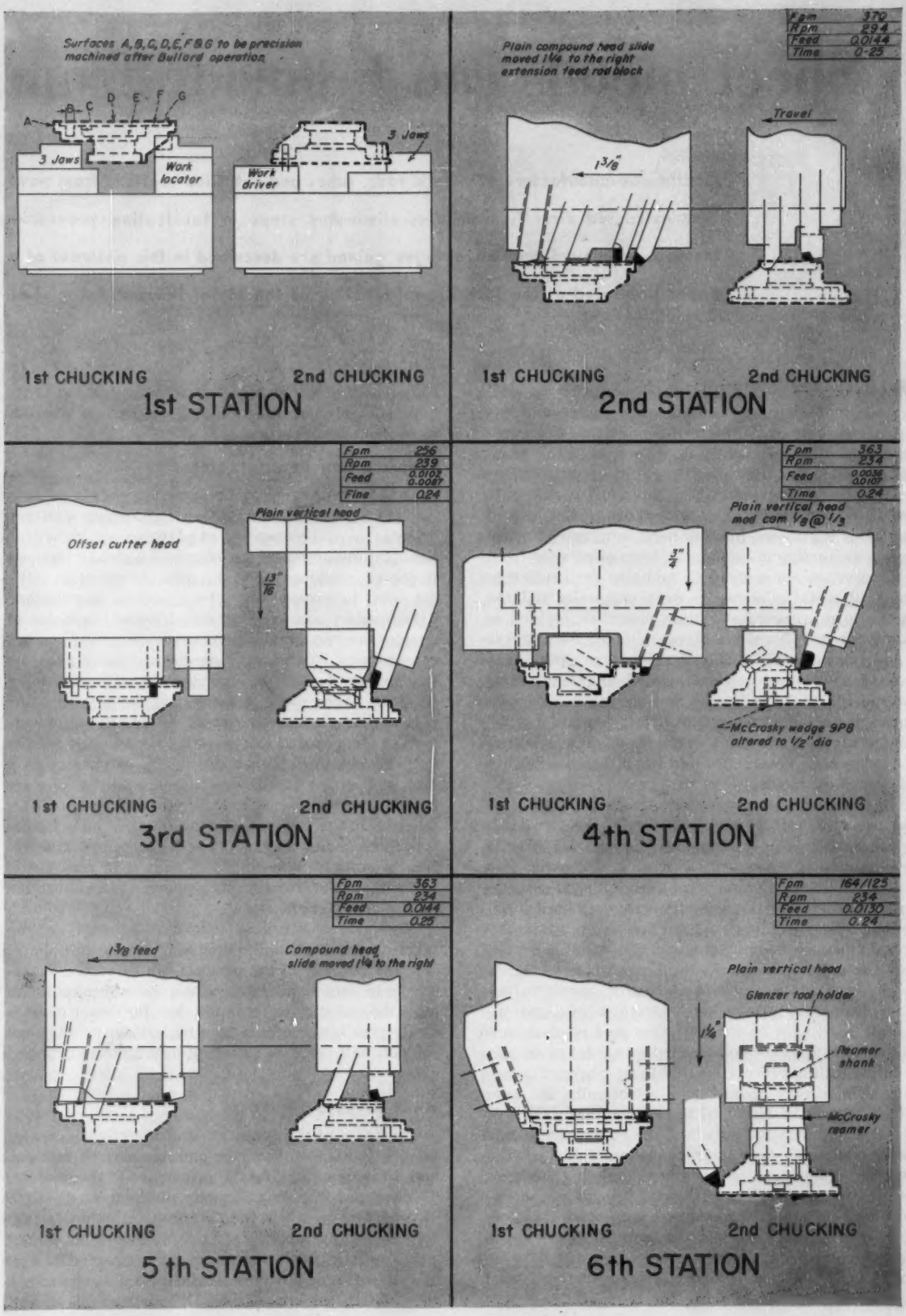
Final assembly and inspection are simultaneous, the pump parts being carried by overhead conveyors to this department, where special fixtures and inspection equipment permit checking while assembling. After assembly, the finished pumps are tested for noise, delivery rate and developed pressure in a hydraulic unit specially built to simulate a range of operating conditions.



TWO SIDES OF A CI PUMP HOUSING are rough machined simultaneously in a 12-spindle Bullard Mult-Au-Matic by dividing 12 stations into 6 for each side. Castings are placed in first chuck at loading station from pan on inclined cradle. Those previously machined on one side during first 6-station cycle are removed from first chucking positions and loaded into second for machining opposite side in second cycle. Carbide tooling removes about 1/16 in. stock per side, is arranged to turn, face, chamfer, ream, and with a special eccentrically rotating head, to rough-bore eccentric cavity in housing. Production rate runs over 90 pc per hour



QUALITY CONTROL CHARTS are posted on floorstands located throughout the machine line to expedite charting the trend of critical dimensions from one operation to another. Charts show blueprint dimension and unit of measurement for a particular critical dimension; in this case 0.0006 and 0.0001 in. Actual measurements are listed as single figures, 1, 5, 2, 2, 2, etc., and are added to arrive at a sum from which average run of the dimension can be determined and registered graphically. Range is also shown graphically after determining difference between largest measurement and smallest. Not only do these charts show the day-to-day conditions to all interested personnel, but they provide a permanent case history of the operation


Surfaces A,B,C,D,E,F&G to be precision machined after Bullard operation
A B C D E F G
3 Jaws
Work locator
Work driver
3 Jaws
1st CHUCKING
2nd CHUCKING
1st STATION
Fpm 370
Rpm 294
Feed 0.0144
Time 0-25
Plain compound head slide moved 1¼ to the right extension feed rod block
Travel
1 3/8"
1st CHUCKING
2nd CHUCKING
2nd STATION
Fpm 256
Rpm 239
Feed 0.0102 0.0087
Fine 0.24
Offset cutter head
Plain vertical head
13/16"
1st CHUCKING
2nd CHUCKING
3rd STATION
Fpm 363
Rpm 234
Feed 0.0038 0.0101
Time 0.24
Plain vertical head mod cam 1/8 @ 1/3
3/4"
McCrosky wedge 9P8 altered to 1/2" dia
1st CHUCKING
2nd CHUCKING
4th STATION
Fpm 363
Rpm 234
Feed 0.0144
Time 0.25
1-3/8 feed
Compound head slide moved 1¼ to the right
1st CHUCKING
2nd CHUCKING
5 th STATION
Fpm 164/125
Rpm 234
Feed 0.0130
Time 0.24
Plain vertical head
Glenzer tool holder
1¼"
Reamer shank
McCrosky reamer
1st CHUCKING
2nd CHUCKING
6th STATION

Sheet metals can be made from

Continuous manufacture of sheets, rods, tubes and extruded sections from powders extracted directly from ores eliminates steps in fabricating processes. Methods employed and advantages gained are described in this abstract of a paper presented at the 10th Annual Meeting of the Metal Powder Association

Metalworking is fast becoming aware of the continuous manufacture of sheets, rods, tubes, and extruded sections by rolling metal powders. Economic advantages lie principally in reduction of the number of rolling and annealing operations required. Development of this method of manufacturing products directly from powders instead of fused or melted materials is growing hand in hand with recent progress in extracting metals in the form of powder from their ores, or concentrates. Actually the great majority of metallic elements were originally isolated in the form of powder. Fusion processes, as well as extraction as a fused metal, came later. Platinum is a classic example of this in that it was originally extracted as a powder, then molded and sintered to produce parts. Later fusion and casting were introduced as steps in processing it. Tungsten and molybdenum are also excellent examples of materials that are extracted as metal powder and almost invariably processed by molding and sintering.

To obtain maximum economic advantage of the extraction of metals from ores in powder form, it is apparent then that processing the material directly into shapes is necessary. Extrusion, spraying, and rolling powders are now being accomplished successfully in commercial production. Dow Chemical Co, among others, has long realized that magnesium metal and magnesium-alloy powders can be extruded below the melting point. At the brass works of Sundwiger in Kreis Iserlohn in Germany, copper, phosphor bronze, cupro-nickel bearing alloys and bimetallic strip for bearing, friction, and electric contact applications are being rolled into sheet materials.

In the rolling process, a suitable feed hopper is employed to convey powder to a set of rolls, the axes of which may be either in the horizontal or vertical plane. Powder falls freely into the roll gap at a rate depending upon flow characteristics of the powder and the dimensions of the arrangement. Of course, in the case of powders with poor flowing properties or where high rolling speeds are employed, it is possible to force-feed the powder into the rolls. Practical development work is now in progress, both in the United States and Europe, on specific features of design of large-scale mills for feeding powder to rolls of either horizontal or standard vertical types to attain uniform thickness and optimum feed rates in continuous operation.

POROSITY CAN BE CONTROLLED

As the powder goes further into the rolls, a point is reached at which compression commences and reorientation and movement of particles occurs, with a resulting reduction in porosity and a steady increase in power consumption of the rolls. At a certain critical point in compacting, when porosity has reached a low value and when the individual particles of powder are no longer able to move freely, power consumption of the rolls increases considerably. As the process continues, considerable deformation of particles takes place, power rises steeply, and the porosity can, in extreme cases, be wholly closed up. It might be noted at this stage that conditions are not entirely identical with compression of powder in a die. In the last stages of die compression, powder particles receive more or less hydraulic compression, whereas in the last stages of rolling, the particles retain more or less one degree of freedom in the direction of rolling. This indicates that it is possible to apply more deformation to a powder in rolling than in die compaction.

Obviously the rolling deformation need not be taken to the limit and, depending on the initial roll gap, the porosity of the product can be varied as desired. In fact it may frequently be unprofitable to take the rolling deformation too far because it is easily possible to attain such high densities that expansion will occur in sintering because of entrapped gases.

WHAT AFFECTS THICKNESS

Thickness of the strip that can be rolled increases linearly with roll diameter and depends on roll gap and, to some extent, on the properties of the powder. Thickest possible strip depends on the green strength of the powder, while the thinnest strip that can be rolled depends upon the softness and work hardening characteristics of the metal powder concerned as well as roll-pressure power available and stiffness of the rolls. Strip thickness is not too dependent on roll

metal powder

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surface, lubrication, roll speed, or particle size although each of these factors has some influence.

Obvously the maximum thickness before sintering is limited by the green strength of the strip which must be sufficient to permit handling during sintering. Amount and type of handling will vary with sintering conditions. For example, the strip may be supported on a conveyor belt and be sintered in a straight-line conventional sintering furnace, or the green strip can be coiled and sintered in any other suitable type of furnace. All the variables and conditions that apply to normal sintering of powdered-metal compacts apply with this process, too. Sintering (and rolling, too) can take place in reducing, inert, or reduced-pressure atmospheres. Maximum density and suitable physical properties are not necessarily obtained in one sintering, and present results indicate that two heat treatments are likely to be necessary. These physical properties are typical of those obtainable from strip made of copper powder:

Thickness	0.010 in.
Density	8.92 gm per cc (25 C)
Tensile strength	40,000 psi
Elongation, 2 ins	33.5%
Electrical conductivity	100%

PROCESS ECONOMICS

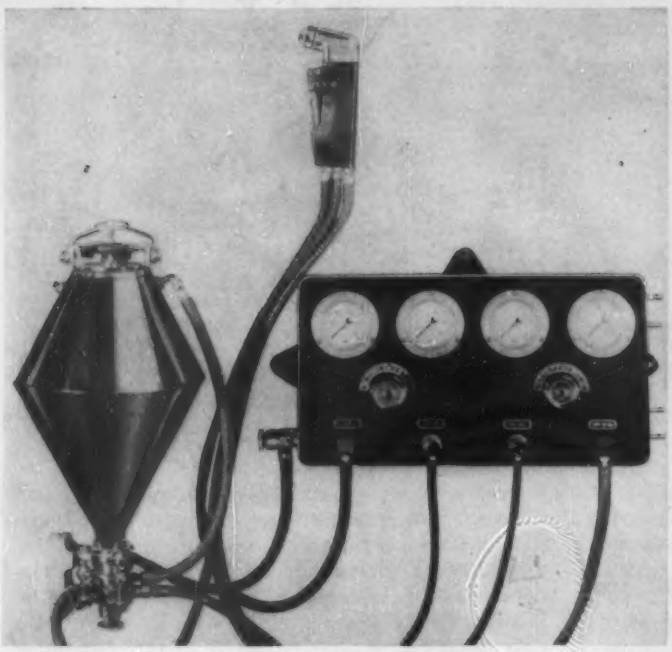
The future of powder-rolling processes will, of course, depend on economics, that is the cost of rolling and sintering and the cost of powder. After all, rolling is very similar to any other rolling, therefore costs much the same. Sintering, for example, compares with annealing and also costs about the same to perform. The economic advantage of the process lies simply in the reduction in the number of rolling and annealing operations that can be effected. Maximum advantage occurs in metals that work-harden easily. In the case of bronze, 10 or 15 rollings accompanied by an equal number of anneals may be required to reduce a billet down to strip 0.010 in. thick. This could easily be accomplished with equivalent properties by a maximum of three rollings and anneals starting with powder.

Even with more malleable metals such as copper, the cost situation is still very favorable and permits a small producer to fabricate strip from powder for several cents per pound cheaper than by conventional methods in larger plants of normal capacity. It might not be possible to gain this saving by using electrolytic copper powder, but by employing powder derived from scrap, strip costs can be as low or lower than with electrolytic powder. A development by Chemical Construction Co, under license to Chemetals Corp, provides a means of extracting copper from high- or low-grade copper or brass scrap as well as from copper ores. Whitaker Cable Corp, Kansas City, also has a plant about to go into production of copper powder from scrap. To achieve maximum economic advantage from the process, Chemetals Corp is studying and developing methods of powder fabrication which include rolling, spraying and extrusion.

Derived from scrap, or even blister copper, it is likely that the manufacture of copper strip by powder-rolling will be undertaken on a very substantial scale at a number of plants in various parts of the world during the next few years. Such developments will also stimulate production of other rolled materials by similar methods. Alloying by interdiffusion of powders, of course, presents no difficulties and it can reasonably be expected that powder-rolling techniques will be developed for heat-resisting alloys. Powdered Metallurgy Ltd, for example, has been concentrating on powders suitable for rolling, or incorporation in rolling mixtures, of such materials as stainless steels, Stellites, Vitallium, cupronickel, Kanthal, Nimonic, etc.

HEAT-RESISTANT SHEET

Heat-resisting alloy sheets are likely to have an important future. Some of these alloys present rolling difficulties because of low green strength and it has been found that they can be handled effectively by means of a powder-flame spray gun. This is especially useful, where small quantities are involved or where special shapes are needed. It is also particularly well suited for the manufacture of porous sheet materials. A powder-flame spray device de-



SPRAYING METAL POWDER into sheet and shapes is accomplished with this powder flame spray gun. Powder can be conveyed in a protective atmosphere from a common dispenser to several gun heads for automatic operation in sheet manufacture. Hand grip turns on and shuts off fuel gas, oxygen, compressed air and powder conveying gas in proper sequence

veloped for this work is the Berk pressure-fed gun in which closing a hand grip turns on fuel gas, oxygen, compressed air, and powder-conveying gas in proper sequence. Release of the hand grip turns these off in the reverse sequence but leaves on a small pilot flame—a novel advantage in spray pistols. As a result, gases are substantially consumed only during actual spraying. Furthermore, the pistol is easily adaptable to automatic plants where the sequence of operations may necessitate the gun idling for some part of a cycle. A combination of several automatically operated gun heads, fed with powder conveyed in a protective atmosphere from a common powder dispenser, is admirably adapted for the manufacture of sheets.

This particular gun can be operated with a variety of gases such as acetylene, propane, natural or city gas. In typical applications, one pistol head will consume 45 cu ft of propane together with 178 cu ft of oxygen and 430 cu ft of compressed air per hour, or, alternately, 90 cu ft of natural gas, 150 cu ft of oxygen and 350 cu ft of compressed air per hour. In these two cases, total operating costs for gases are about $2.75 per hour for propane and $2.00 per hour for natural gas. From this it can be seen what the cost of operation per gun head will be in spraying metal powder at about 13 lb per hour in the case of copper and 7 to 8 lb per hour for stainless steel, Vitallium, Kanthal and Nimonic alloys. For a sheet thickness of 25 mils, this covers an area of about 9 sq ft per hour for copper and 5 to 6 sq ft per hour for the alloys.

Substantially lower costs are possible in spraying zinc, aluminum or other low-melting-point metals. For example, with zinc it is possible to spray a coating 3 mils thick at a rate of 265 sq ft per hour using 35 lb of metal with a gas cost of $1.75 per hour for propane and $1.50 per hour in the case of natural gas. In sheet production by spraying Vitallium, stainless steels, and Nimonic materials, operating costs are entirely reasonable, especially if odd shapes and sizes are involved. The process is particularly attractive to manufacturers of porous sheet materials, and odd shapes have been made by spraying heat-resisting alloys on both sides of a fine wire mesh employed as a carrier.

Tips

FOR TOP SHOP MEN

476 If you expect alertness and uptodateness on the part of your employees, show it yourself. Ancient equipment, methods, and thinking in your plant are hardly likely to induce modern thinking, designs, or work on the part of your men.

477 You wouldn't expect a fire department to be able to handle a town where everyone kept starting fires in the attic and then calling up for help. In the same way, you shouldn't expect your personnel department to be a fire department for poor personnel policies. Work along with Personnel, not against them.

Thermal number measures efficiency of metal cutting

American Machinist

SPECIAL REPORT

NUMBER 365

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330 W 42nd ST, N Y 36, N Y

Whenever metal is cut, most of the mechanical energy expended shows up as heat. Distribution of this heat among workpiece, chip, and tool is of prime importance in determining the efficiency of a metal-cutting operation. The principal concern is the amount of heat to be absorbed and the capacity of the component (workpiece, chip or tool) which absorbs this heat.

In most metal-cutting operations, this distribution depends upon a *thermal number* (R_t) defined as:

$$R_t = V.t_i/k$$

where

V_c = cutting speed in fpm,

t_i = feed in ipr or ipm

k = thermal diffusivity of the work material

As k is constant as long as the temperature of the work material does not change materially, the *thermal number* can be considered as the speed-feed product ($V_c \times t_i$), or more appropriately as a *work number*, ie, the amount of metal removed at a given depth of cut per unit of time. For practical purposes, the terms *thermal number* and *work number* are synonymous. Also, it makes no difference what units of measurement are used to define speed and feed, as long as they are consistent.

A further explanation of the principle, illustrated by examples, appears on subsequent pages.

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HUNDREDS OF TESTS made on this 16 x 54-in. engine lathe in the Metal Cutting Research Laboratory, University of Illinois, developed the data upon which the conclusions drawn in this discussion are based. Cutting-force data were obtained with the two-component dynamometer on lathe cross slide; tool-chip interface temperatures were measured with tool-work thermocouple as arranged by the author (right)

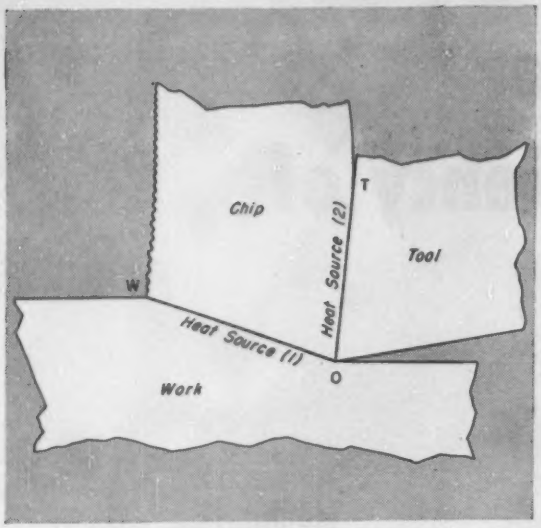


Fig. 1 . . Heat generated when metal is cut by a tool is caused (1) by shear along plane *OW*, and (2) by friction between chip and tool face along plane *OT*. Distribution of heat from both sources is governed by the *thermal number*. Depth of cut has no apparent effect on results

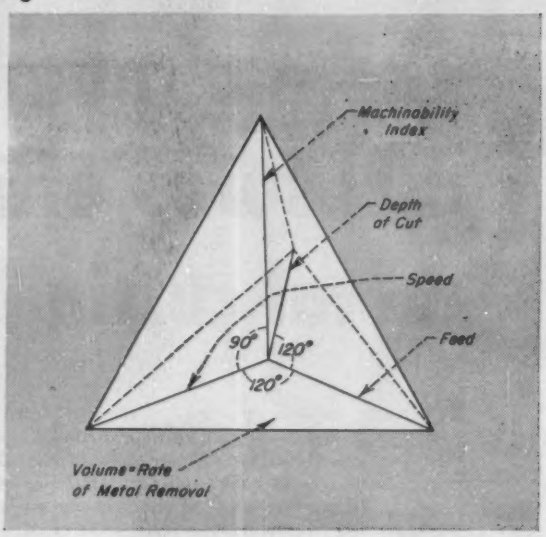


Fig. 2 . . Rate of metal removal may be compared with the volume of a triangular pyramid whose base dimensions are determined by the speed, feed and depth of cut of the operation, and whose height is determined by a "machinability index" related to the properties of the metal

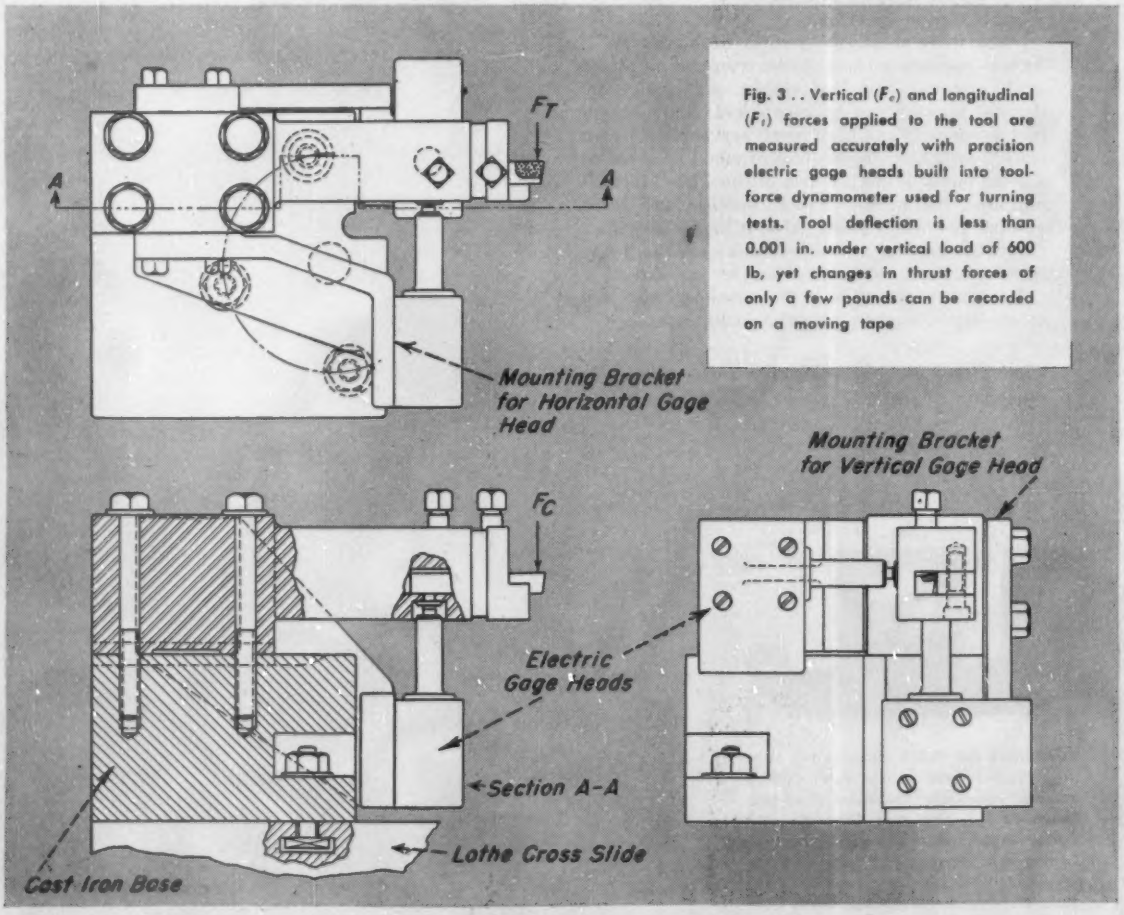


Fig. 3 . . Vertical (F_c) and longitudinal (F_t) forces applied to the tool are measured accurately with precision electric gage heads built into tool-force dynamometer used for turning tests. Tool deflection is less than 0.001 in. under vertical load of 600 lb, yet changes in thrust forces of only a few pounds can be recorded on a moving tape

Heat generated in metal cutting comes from two main sources (Fig. 1): (1) that from chip shear or deformation along the shear zone, and (2) that from rubbing at the tool-chip interface. The former accounts for most (up to 80%) of the total heat generated in cutting. However, the latter may be more detrimental because of its effect on the tool.

The distribution of *shear-zone heat* between the chip and the work is governed by the thermal number. The higher this number, the greater the proportion of shear-zone heat carried away by the chip. In other words, an increase in the *work number*, that is an increase in speed and/or feed, increases the proportion of shear-zone heat carried away by the chip and leaves less of this heat to be absorbed by the workpiece.

It can also be shown (with some allowances for mathematical goodwill) that the distribution of the *tool-chip friction heat* between the chip and the tool is governed by the thermal number. The higher this number, the greater the proportion of friction heat going into the chip. Maximum over-all economy of metal removal requires that consideration be given to each of the four factors (speed, feed, depth of cut, and machinability index) shown schematically in Fig. 2.

Data upon which this discussion is based were obtained when using carbide-tipped tools to turn steel under such conditions that no builtup edge of any significance was present during the cutting. The presence of an appreciable builtup edge, or a change in the tool-work combination which may be more conducive to a builtup edge, will alter the trends in various degrees but will not seriously affect the validity of arguments presented.

Force data for these tests were taken in the Metal Cutting Research Laboratory at the University of Illinois on a 16 x 54-in. engine lathe equipped with a 10-hp fully adjustable speed drive providing spindle speeds from 15 to 1200 rpm. Mounted on the cross slide of the lathe is a two-component tool-force dynamometer (Fig. 3) employing two precision electric gage heads. The dynamometer is rigid enough so tool deflection is less than 0.001 in. under a vertical load of 600 lb, yet is sensitive enough (through a selector switch) to indicate a force change of only a few pounds.

Effects of cutting speed

1. *On Tool Forces and Shear Energy*—Holding other conditions constant, the effects of changing cutting speed upon tool forces and chip thickness generally follow trends indicated in Fig. 4. Attention is called to the fact that both the speed range and tool-work pair are such that a Type 2 chip (without builtup edge) is produced, except at points below about 60 sfpm. As indicated, the data shown were obtained when turning annealed NE 9445 steel at 68 F, using 0.0098-ipr feed and 0.102-in. depth of cut. The triple carbide tool tip was sharpened to the following shape: back rake, 0°; side rake, 4°; end relief, 7°; side relief, 7°; end cutting-edge angle, 8°; side cutting-edge angle 0°; and nose radius, 3/64 in. No cutting fluid was used. Trends of the same nature, but differing moderately in degree, have been observed for a variety of steels ranging from cold-finished SAE 1018 steel to high-carbon and alloy steels, and for rake angles from plus 10° to minus 5°.

Referring to Fig. 4, and to the cutting conditions noted therein, 100 sfpm may be taken as a base to compare results obtained at various cutting speeds. For example, at 600 sfpm the vertical (or *cutting*) tool force (F_c) is reduced to about 72% of that obtained at 100 sfpm. Similarly, the longitudinal (or *thrust*) tool force (F_t) is reduced to 46%, and the average chip thickness (t_2) is reduced to 56% of values at 100 sfpm.

At speeds below approx 60 sfpm, the force curves are erratic because of excessive builtup edge. The effect of this builtup edge is to cause variability in the true rake angle, therefore to affect the tool forces. Similar tests with HSS tools over a speed range restricted to their capacity show much less change in forces, primarily from the builtup edge.

Tool forces are significant in that they reflect power requirements at a given speed, and the need for machine, tool and workpiece rigidity. Chip thickness is important in that it is a measure of shearing deformation or strain, therefore of the shear energy

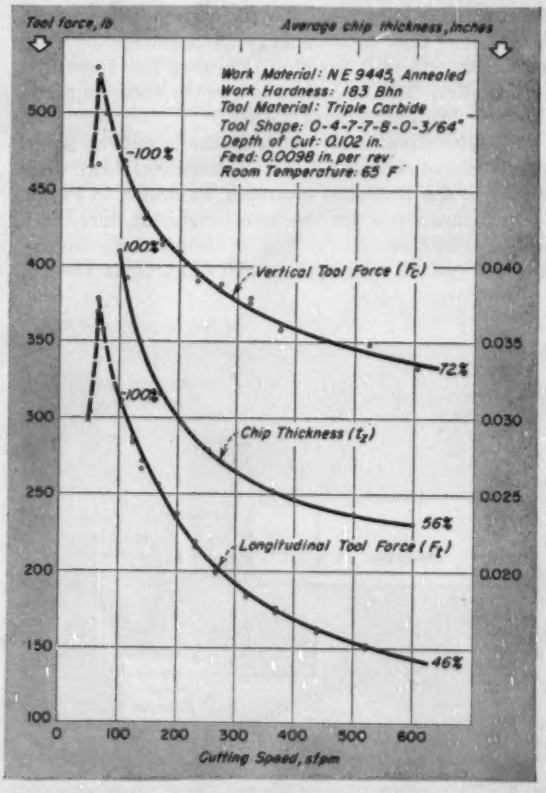


Fig. 4 . . When a builtup edge is not present, increasing speed of cutting results in reduced tool forces and in thinner chips as shown above for tests made when turning annealed NE 9445 steel. Similar curves resulted when testing many different steels and tool shapes

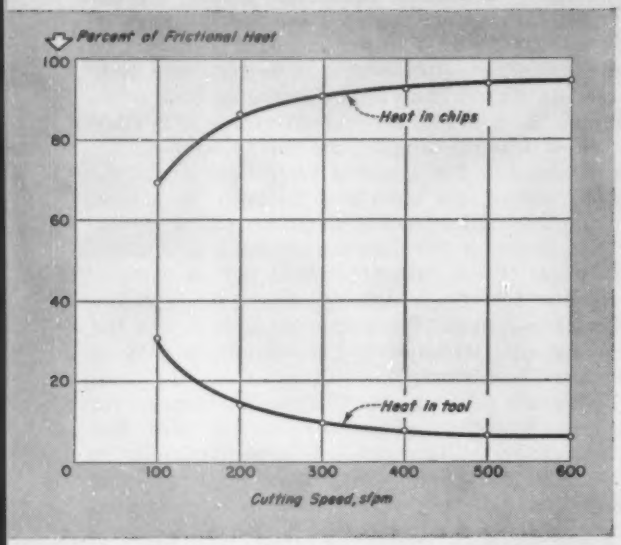


Fig. 5 . . As speed is increased, portion of frictional heat generated at the tool-chip interface that is conducted into the tool-tip decreases as shown above. Most of the heat is carried away in the chips

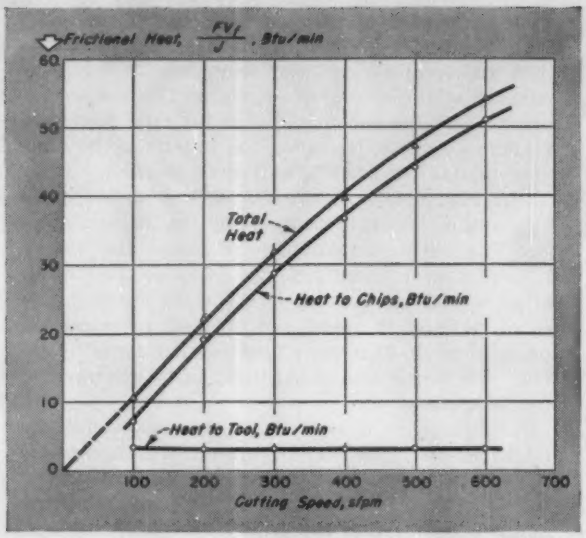


Fig. 6 . . Charting the quantitative distribution of heat developed at the tool-chip interface when machining NE 9445 steel as shown. Only some 3 to 4 Btu/min is transferred to the tool for the conditions illustrated

required per cubic inch of metal removed. It also indicates the temperature rise of the chip from shear. A decrease in chip thickness for a given rate of feed means that less shear energy is required for chip formation and that the chip is heated less from this deformation. The net effect is a lower tool temperature rise from chip deformation.

2. *On Friction Heat*—An increase in cutting speed affects the distribution of the frictional heat generated at the tool-chip interface, as shown in Fig. 5. Curves shown are for the same material, tool, and cutting conditions as for Fig. 4. Under these conditions, it can be seen that at 100 sfpm some 30% of the frictional heat is conducted to the tool, while approx 70% passes off in the chips. At 600 sfpm, the percentages are approx 6 and 94% respectively.

Distribution of this frictional heat by quantity is shown in Fig. 6. Particular attention is called to the quantity of heat transferred to the tool, because it is this heat which causes tool failure. Under the conditions indicated, it will be noted that only 3 to 4 Btu per min need be removed to maintain tool temperature. Very similar results were obtained from tests involving other materials and tool angles. The small quantity of heat transferred to the tool suggests that flooding with cutting fluid is not nec-

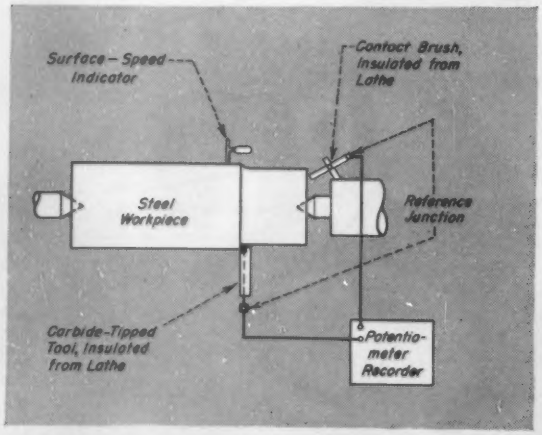


Fig. 8 . . The tool-work thermocouple operates on the principle that the work constitutes one member and the tool tip the other member of a thermocouple. The emf so obtained is converted to temperature by suitable calibration curves. Accuracy is proved by repeated tests

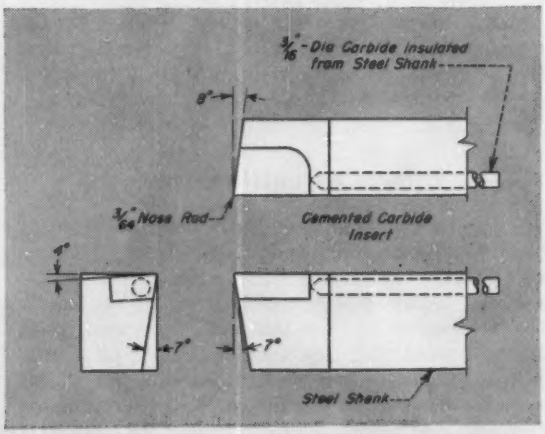


Fig. 9 . . To insure accuracy of temperature readings, the carbide rod inserted through hole in steel shank of tool and the calibration bar must be of exactly the same composition as the carbide cutting tip with which they are used in measuring tool-chip interface temperatures, as indicated in Fig. 8

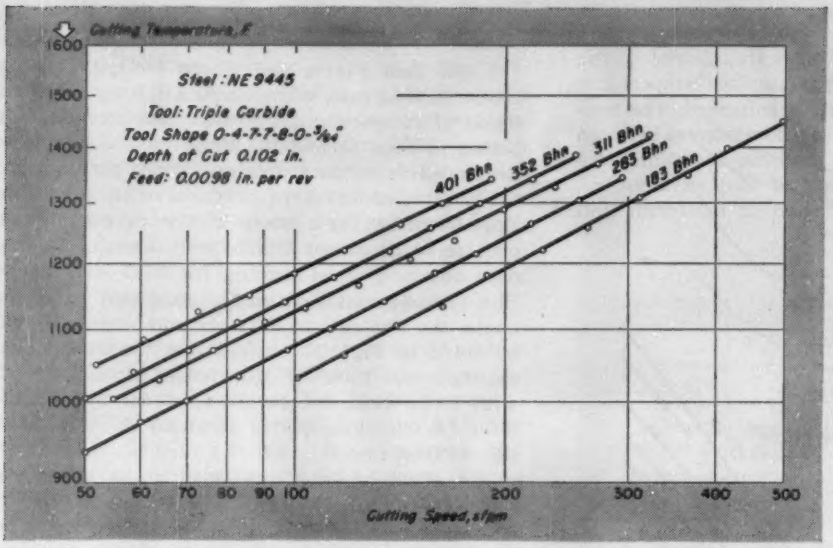


Fig. 7 . . Tool-chip interface temperature increases with both speed and hardness of metal being cut, as charted above for five hardnesses of NE 9445 steel. This is because while quantity of heat transferred to tool is nearly constant, it is concentrated on smaller portion of tool as speed goes up, as chip thickness is reduced

essary to provide adequate cooling. This is an explanation for the success of spray cooling.

3. *On Tool-Chip Interface Temperatures* — The effect of cutting speed on tool-chip interface temperatures for the same cutting conditions as for Figs. 4, 5 and 6 is shown in Fig. 7 for NE 9445 steel of five hardnesses. Interface temperatures were *measured* by the tool-work thermocouple principle shown schematically in Figs. 8 and 9. In this adaptation of the Herbert-Gottwein tool-work thermocouple, the steel workpiece is one member of the thermocouple and the cemented-carbide tool tip is the other member.

Tool-chip interface temperature increases with both the cutting speed and the hardness of the workpiece, Fig. 7. This effect of cutting speed on interface temperature may appear to be contrary to the effect of speed upon the quantity of heat transferred to the tool, Fig. 6. The explanation for this apparent paradox lies in the effect of speed upon total chip-contact area, as shown in Fig. 10. Even though the quantity of heat delivered to the tool is nearly constant, this heat is concentrated on less area (and volume) of tool material at the higher speeds. As a consequence, tool-chip interface temperature is increased and tool failure accelerated.

Summarizing the effects of cutting speed (and confining the discussion to a Type 2 chip), it is seen that an increase in speed increases the rate of metal removal, decreases tool forces, decreases the chip

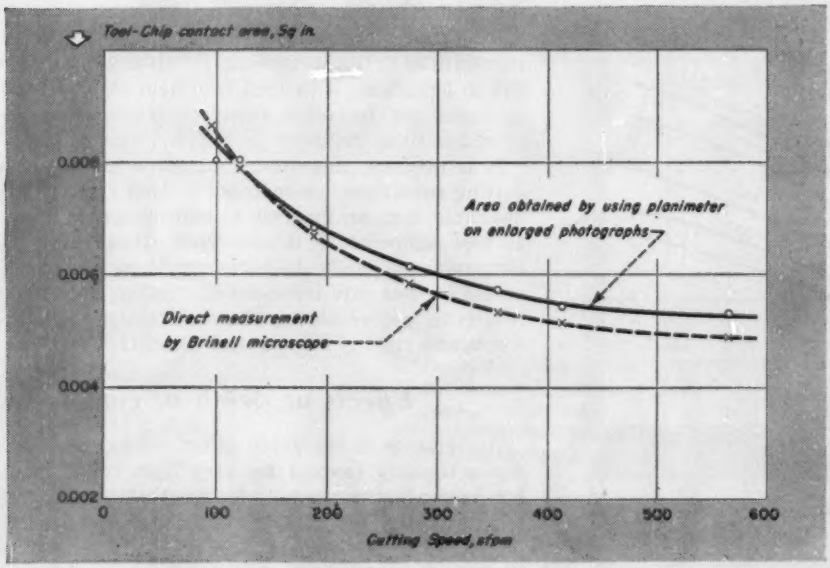


Fig. 10 . . Measurements of tool-chip contact areas developed when turning steel with carbide-tipped tools at a wide range of cutting speeds prove that this area is reduced gradually as speed is increased. Chart is for annealed NE 9445 steel

thickness and shear energy per unit volume, and increases the proportion of heat transferred to the chip. Conversely, the tool-chip interface temperature is increased and tool failure is enhanced. The economical balance is attained as a compromise between rate of metal removal and machine downtime, tool setup time and related costs of tool replacement. The optimum speed is reflected in minimum unit workpiece cost.

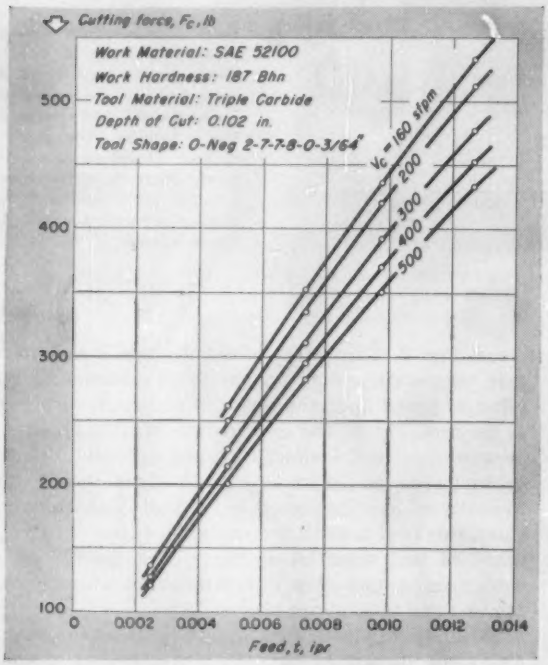


Fig. 11 .. Cutting force (F_c) increases almost linearly with increases in rate of feed. Curves are for annealed SAE 52100 steel of 187 Bhn

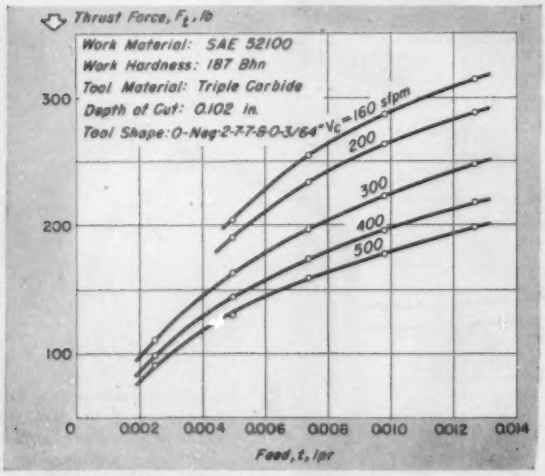


Fig. 12 .. The longitudinal thrust force against the cutting edge of the tool (F_t) increases as feed is increased, but less rapidly than does the vertical cutting force (F_c). Other steels show similar results

Effects of feed rate

1. *On Tool Forces and Shear Energy* — An increase in feed rate, while holding cutting speed and depth of cut constant, will affect the tool forces as shown in Figs. 11 and 12. While these curves were developed from data obtained when turning SAE 52100 steel of 187 Bhn hardness with a carbide-tipped tool having a minus 2° side rake angle, and previously discussed charts were developed from data obtained when turning NE 9445 steel at 183 Bhn (except as noted) with a positive 4° side rake angle, the two sets of data are comparable. It will be noted in Figs. 11 and 12 that the vertical (or *cutting*) tool force (F_c) increases almost directly with feed, while the longitudinal (or *thrust*) tool force (F_t) is more nearly parabolic in its relationship to feed rate.

The effect of feed rate upon shear strain and shear energy per cubic inch is shown in Fig. 13. It will be noted that an increase in feed decreases both the shear strain and specific shear energy requirement. This means less heating of the chip from shearing strain. As the shear energy accounts for about 80% of the total energy required for metal removal, the beneficial effect of an increase in feed is readily apparent. However, it must be remembered that while an increase in feed improves the efficiency of metal removal, it also increases the forces involved and the need for greater machine, tool and workpiece rigidity. Likewise, it also leads to deterioration of surface finish.

2. *On Tool-Chip Interface Temperature* — As indicated in Fig. 14, an increase in feed causes higher tool-chip interface temperatures. However, the effect is considerably less than that for a similar increase in cutting speed. Therefore, from the viewpoint of resultant tool temperature, it is better to increase the feed than the speed in attempting to increase the rate of metal removal.

For the conditions indicated in Fig. 14, doubling the feed rate from 0.005 to 0.010 ipr at 250-sfpm cutting speed increases tool-chip interface temperature only 90 F. But increasing the cutting speed from 250 to 500 sfpm, with feed rate held at 0.0098 ipr, increases the tool-chip interface temperature approx 200 F, as indicated in Fig. 7.

It is obvious, therefore, that for a given set of cutting conditions, an increase in feed rate is more desirable than an increase in cutting speed, insofar as tool temperature is concerned. However, some compromise usually is necessary, because an increase in feed rate increases the cutting forces and results in poorer surface finish. Machine, tool and workpiece rigidity may again be limiting factors.

Effects of depth of cut

An increase in the depth of cut increases the tool forces linearly (except for very light cuts), therefore increases the necessity for greater machine power and rigidity, tool strength and support, and workpiece rigidity. Moreover, the effect of change in

depth of cut on the tool-chip interface temperature is negligible once the depth of cut is appreciably greater than the nose radius of the tool. Test cuts made with a 0.015-in. nose-radius tool have shown negligible change in tool-chip interface temperature for depths of cut ranging from 0.050 to 0.250 in., with other cutting conditions held constant. Under similar conditions it is also true that the depth of cut has no effect on the various speed-feed relationships as indicated by the thermal number.

Effects of thermal number

The composite effect of a change in speed and/or feed can be illustrated by a few relationships involving the thermal number. Fig. 15 shows the relationships between the thermal number (R_t) and the shear angle over a range of feeds in excess of 5 to 1 and a range of speeds over 4 to 1 when turning SAE 52100 steel of 187-Bhn hardness with a 0-Neg 2-7-7-8-0-3/64-in. carbide-tipped tool at 0.102-in. depth of cut. It will be noted that the calculated values for all combinations in this speed and feed range fall on the single curve. An increase in the

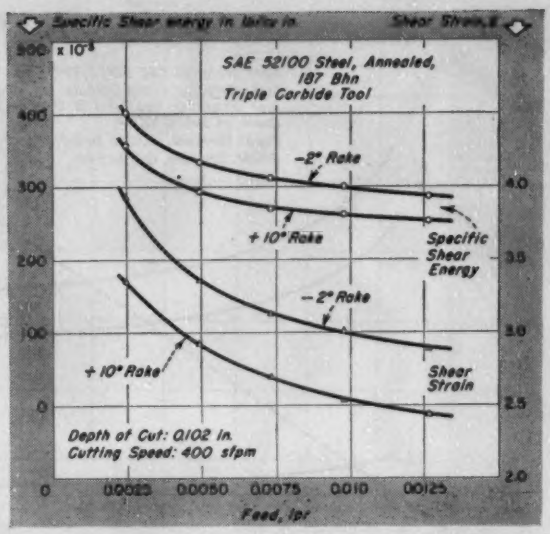


Fig. 13 . . Shear strain and specific shear energy required are reduced as rate of feed is increased. Hence less heat is generated while metal is removed faster when higher feed rates are employed. This gain in cutting efficiency is offset by reduction in finish quality

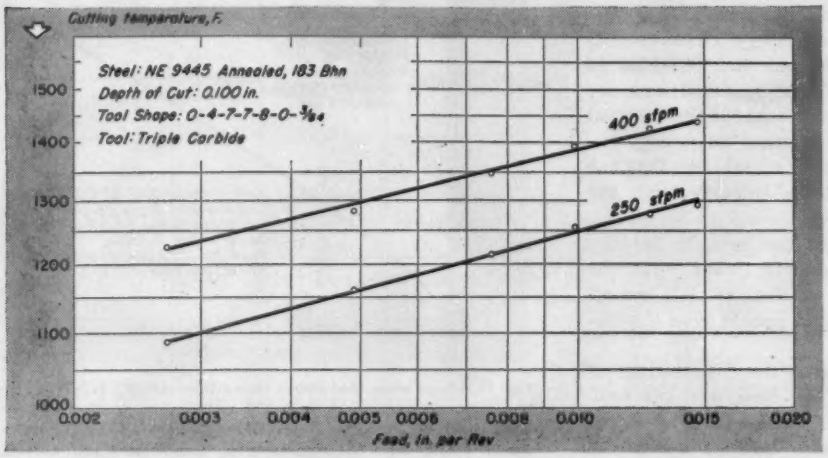


Fig. 14 . . Tool-chip interface temperature goes up as feed rate is increased, but less rapidly than when speed is increased (Fig. 7). If other conditions can be disregarded, it is better to boost feed rate than surface speed when increasing rate of metal removal. But this is not always economic and lack of rigidity may make it impossible

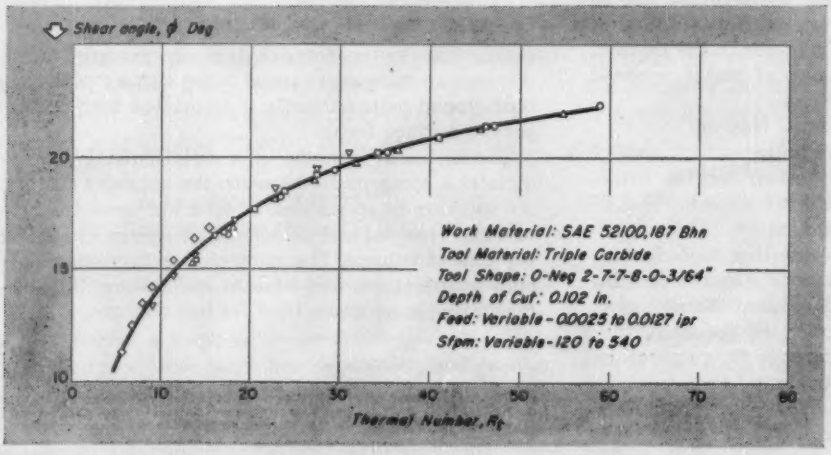

Shear angle, ϕ Deg
Work Material: SAE 52100, 187 Bhn
Tool Material: Triple Carbide
Tool Shape: 0-Neg 2-7-7-8-0-3/64"
Depth of Cut: 0.102 in.
Feed: Variable - 0.0025 to 0.0127 ipr
Sfpm: Variable - 120 to 540
Thermal Number, R_t

Fig. 15 . . Increasing the *thermal number* (speed × feed) has been proved to increase the shear angle. This reduces shear strain and results in less temperature rise due to shear. Curves for other steels are similar

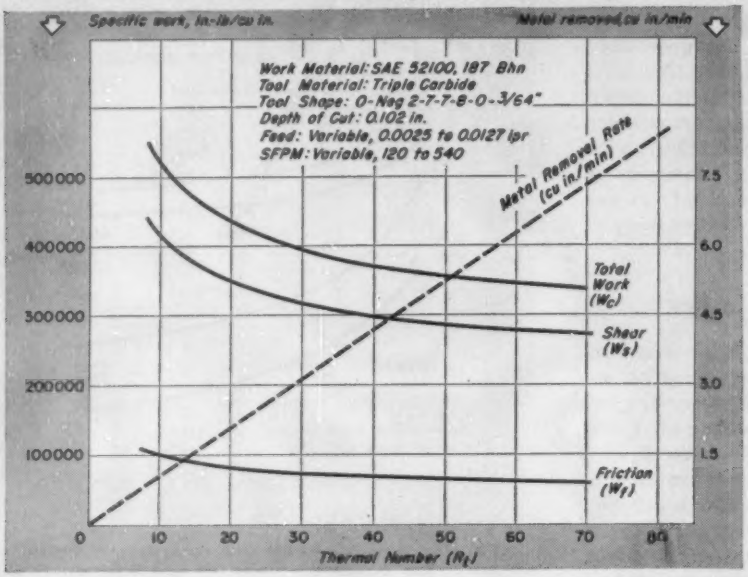


Fig. 16.. Energy requirements per unit volume of metal removed are reduced as the *thermal number* is increased. Metal removal rate increases linearly at the same time. Both are desirable results

shear angle means less shear strain and consequently lower shear energy required per cubic inch of metal removed, and less temperature rise from shear.

Relationships between the energy requirements per cubic inch of metal removed and the rate of metal removal for the same cutting conditions are shown in Fig. 16. Note that an increase in the thermal number (or *work number*) decreases the energy required to remove a cubic inch of metal, and that the rate of metal removal increases linearly with the thermal number.

The total energy expended per minute for the same cutting conditions is nearly linear with the thermal number, as shown in Fig. 17. All values for the wide range of feeds and speeds give a well-defined relationship.

The thermal number governs the distribution of heat among the workpiece, the chip, and the tool. An increase in this number means that a lower percentage of the shear zone heat is conducted into the workpiece. Therefore, an increase in speed and/or feed will result in less temperature rise in the workpiece and thus decrease the possibility of heat distortion. Similarly, an increase in the thermal number improves the efficiency of metal removal and also the rate of metal removal.

However, there are two limiting factors:

1. Mechanical aspects of the setup—which involve the rigidity of the machine, the tool and the workpiece. In general, a more rigid over-all setup is conducive to better cutting conditions.

2. Thermal aspects—or the limiting tool-chip interface temperature. An increase in speed or feed increases this temperature and reduces the ability of the tool to withstand the action of the chip, thus shortening tool life. With reference to temperature, an increase in feed is less detrimental than is a corresponding increase in speed. However, it should be kept in mind that an increase in feed is usually accompanied by a deterioration in surface finish, whereas an increase in speed when cutting with carbide-tipped tools normally is associated with an improved surface finish.

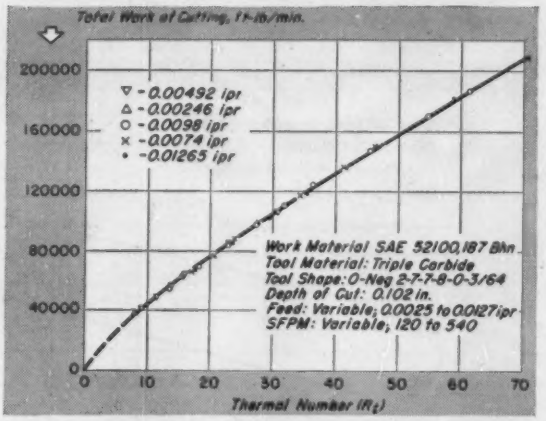


Fig. 17.. Even when feed rate is varied from 0.00492 to 0.01265 ipr, and surface speed ranges from 120 to 540 sfpm, total energy expended per minute varies almost directly with the *thermal number*. Similar results were obtained for other steels tested with carbide tipped tools

The ultimate economy of a metal-cutting process dictates a compromise between the opposing factors. An increase in speed and/or feed increases the rate of metal removal and decreases the energy expended per unit of volume. The same change increases tool-chip temperatures and hastens tool failure, thus necessitating more down time for tool changes.

The author hereby acknowledges the cooperation and valuable help given by Dr B T Chao, associate professor of mechanical engineering, University of Illinois, during the investigations which have led to these conclusions.

Round Table

Muff 'n Stuff

"I hear by the grapevine that you're housecleaning again, Al. How's the hunt coming along?"

"Awful good, Ed; or awful bad, depending on how you look at it. We turned up about a dozen good pieces of work that should have been finished, but never were. Now I'm trying to find out who ruined them."

"You're headed for trouble, Al. You'd better just be content to throw that junk out, and don't inquire too closely into why and by whom they were ruined."

"Why not, Ed? If I can find out, then I can bawl out the men responsible. Maybe that will keep them from doing the same again."

"I doubt it. You can't ever completely stop work spoilage, and all you'll really do is get everyone mad at you."

"So what? Who are they working for, the company or for their own amusement? Why can't we bear down on them—really tighten up? It's sure to produce better results for a while."

"For a mighty short while, Al. And you'll have discontented men in the shop, too. Why not just root out the stuff, make a show of looking it over, and then throw it out? Then you make your point and don't offend anyone."

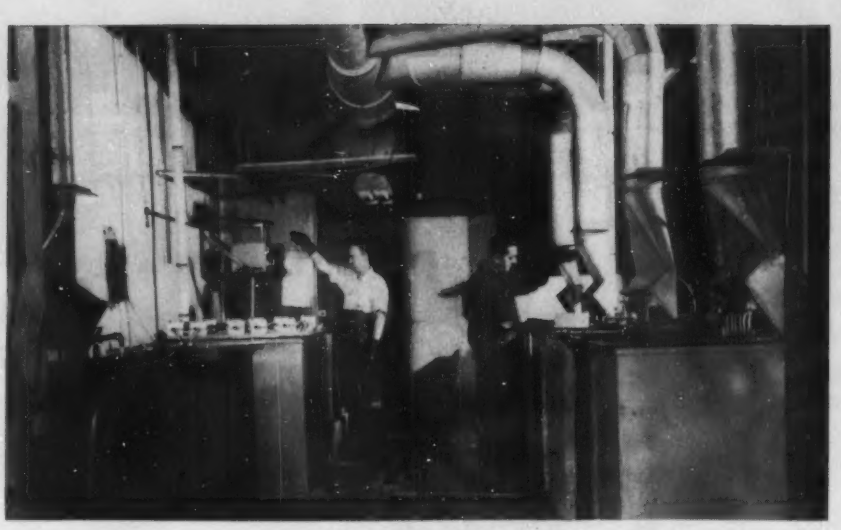
"Look, Ed; I'm the one who's offended, and I want them to know it."

"OK, so you're offended. So is the company, too, I guess. But don't forget the fact that you'll get more work done better by keeping the working force happy and active—not by running out and accusing them of plotting to produce scrap."

"Don't get overheated, Ed. I'm just trying to make sure that it won't happen again."

"That's something you can't do, Al. Everyone can make a mistake and if it doesn't happen often, why look for more trouble?"

Should a foreman vengefully track down workers who spoil work, or should he forget it, depending on time cards, inspection department, and good intentions to keep scrap costs down? Your opinions on this subject may help others. Discussions of earlier topics appear on later pages.



NICKEL-PLATING LINE is used in preparation of aluminum for soldering. Counterclockwise, tanks provide: alkaline cleaner, water rinse, acid (sulfuric) etch, water rinse, nitric-acid dip, water rinse, zincate immersion, two water rinses, nickel plate, cold-water rinse, and hot-water rinse. Cleanliness and close control are essential to satisfactory bond

How to . . .

Nickel-plate aluminum for

Aluminum is one of the most difficult metals to plate or to soft solder. After only a brief exposure to the atmosphere, an aluminum surface usually will refuse to form a good bond. At Ford Instrument Co, Long Island City, NY, (Div of The Sperry Corp) hermetic sealing of aluminum instrument cases is necessary. Success is achieved by nickel plating the case; then induction or hand soldering. Cleaning technique is the secret

WM M STOCKER, JR. associate editor

Soldered joints are practical on aluminum. And in this age of electronics, with an ever-increasing use of aluminum for chassis and components—together with automatic assembly, solder-aluminum joints are broadly applicable. While it is possible to form soldered joints directly on aluminum by using ultrasonic methods, the large areas involved decided the Ford Instrument Co to use a method in which the aluminum parts are preplated with pure nickel. Then the nickeled surfaces are soft-soldered by induction heating or hand-soldering. These operations are done on a production basis. The finished instruments are used without trouble at the extremes of pressure and temperature required for military aircraft.

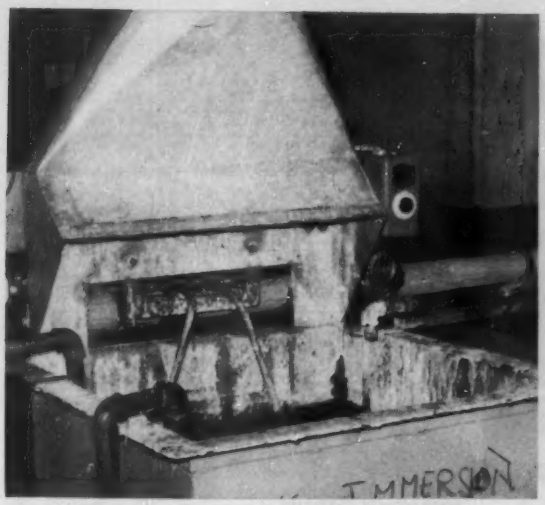
Two distinct steps are used in preparing aluminum parts for soldering: First the components are prepared for plating; then they are nickel plated. Preparation is at least as important as plating because *contaminated surfaces will not plate* with sufficient strength to permit a sound soldered joint.

PREPARATION

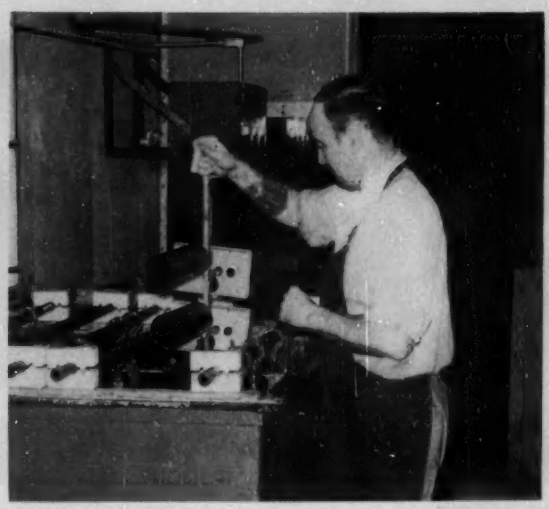
1. Degrease thoroughly in vapor degreaser.
2. Place parts on plating racks. Rack parts with grooves, such as covers or channels, so that the concave side of the groove will face the nickel anode during plating. (Parts remain on this rack throughout process.)
3. Alkali clean for 1 to 3 min. in solution from 9.0 to 12.0 pH, with a maximum of 12.0 pH. Keep tank and solution clean. Temp 140-180 F.

From this operation on, it is important and necessary that *parts must not be touched with bare hands.* If handling is necessary, use water-wet rubber gloves.

4. Rinse, thoroughly, in cold, *running* water.
5. Immerse parts in sulfuric-acid bath, maintained at 175-180 F, for 2 to 5 min.
6. Rinse, thoroughly, in cold *running* water.
7. Immerse parts in nitric-acid bath, maintained at 60 to 80 F, for 1 to 3 min.
8. Rinse, thoroughly, in cold, *running* water.
9. Immerse parts in sodium-zincate solution, maintained at 70 to 90 F, for ½ to 1 min. *Agitate* parts in this bath and be certain that all part surfaces remain below the surface of the solution during agitation. Agitation will prevent black, streaky zinc coatings.
10. Rinse, thoroughly, in cold, *running* water.
11. Strip zinc coating in concentrated nitric acid at 60 to 80 F. *Parts are completely stripped when gassing ceases.*
12. Repeat cold-water rinse.
13. Alkali clean at 140 to 180 F for 10 to 30 sec.
14. Repeat cold-water rinse.

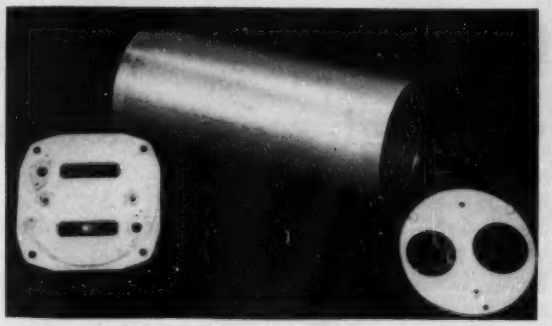


SODIUM ZINCATE is used in rubber-lined steel tank. By twice applying and stripping zincate coating, aluminum surface is made extremely clean. Hot-water coil is used to hold solution temperature



NICKEL-PLATING RACKS are evenly spaced in the tanks to provide equal distribution to all parts. Slight, but frequent, agitation prevents bubble formation from spoiling plate

solder joining



ALUMINUM PARTS for instrument case are nickel plated prior to hermetic sealing by induction soldering. Use of nickel permits good soft-solder bond and provides some cushioning against distortion which might occur from differences in expansion coefficients

15. Repeat nitric-acid treatment (7).
16. Repeat cold-water rinse.
17. Repeat sodium-zincate coating procedure (9); then rinse twice in cold, *running* water.

Effectiveness of second rinse is tested by applying a piece of red litmus paper to the water drippings from one of the parts. If the red litmus turns *blue*, parts should be rinsed again and the test repeated. Continue rinsing until the litmus stays red. The double plating and stripping of zinc leaves an absolutely clean and uncontaminated aluminum surface —essential for nickel plating.

PLATING

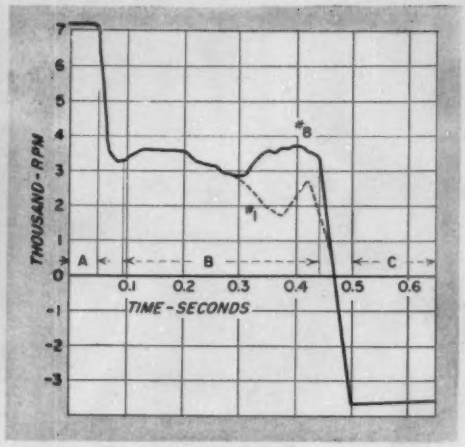
1. Clean anode and cathode bars at frequent intervals to assure good contact between anodes and plating racks.
2. Maintain nickel-plating-solution temperature between 70 and 90 F. Best result is obtained above 80 F.
3. When placing the work racks into the tanks, use a spring clamp to insure good electrical contact. Space the work racks evenly in the tank and, when all of the racks have been placed, cover the tank to keep out dirt and dust.
4. Turn on the power supply (rectifier) to the plating tank, so that the tank is "alive" to receive the first parts. This procedure will allow the parts to plate immediately and it prevents the zincate coating from coming off in the nickel-plate bath. Thus, contamination of the bath is less likely.
5. Nickel plate using a current density of 5 to 15 amp per sq ft of work surface for a time sufficient to produce specified plating thickness. During plating, move the work racks slightly and often. This action will free the gas bubbles that accumulate on the work; thus prevent "bare," unplated, areas. A mechanical vibrator also may be used to provide this agitation.
6. Repeat cold-water rinse, then hot-water rinse.
7. Dry in warm air.

To nickel-plate large, can-shaped parts, place the grooved or beaded end up in the tank. Otherwise, if the groove is down, it will trap air, will not be in contact with the solution, and will not plate.

When large lots are to be plated, load the tank to capacity. This will permit better density and current control. If only a few parts are to be plated, use empty plating racks as dummies so that current can be more closely controlled. Also, when the quantity of work in process is large, the plating solution should be filtered. Thus, the solution is cleaned and agitated—to maintain a uniform concentration of nickel from the top to the bottom of the tank, as well as to remove gas bubbles which form on the work.

After nickel plating, parts should be wrapped and stored, ready for soldering.

ENLARGEMENT of a single 16-mm frame taken from the high-speed motion picture showing combination drilling and tapping operation on an Indexomatic machine. Such studies enabled engineers to pin-point design weaknesses attributing to excessive tap breakage



ROTATIONAL VELOCITY characteristics of spindles 1 and 8. Drilling takes place at *A*, tapping at *B*, and spindle reversal for retraction of the tap at interval *C*

Exposing machine-tool gremlins ... with high-speed photography

LYELL C TULLIS, assistant chief engineer, GILMAN ENGINEERING CO, JANESVILLE, WISCONSIN

Excessive tap breakage was one of the biggest problems facing Gilman Engineering Co, manufacturer of automatic machinery. The trouble existed in one prototype Indexomatic machine. This machine simultaneously drills and taps eight holes in an aluminum piece that goes into an ordnance fuze assembly. The occurrence of tap breakage was an erratic effect, but it could be associated predominantly with certain spindles on the machine. There was no apparent reason for adverse performance of any station on the machine; however this was a foregone conclusion because the rapidity of the operations made a visual analysis impossible.

DESIGN WEAKNESSES

Finally, the only logical conclusion was the possible existence of three design weaknesses which might account for the high frequency of breakage:

1. A prolonged transition period from drilling speed to tapping speed would allow the tap to enter the work at excessive rpm.
2. Stalling of the motors during the tapping phase would allow the cam-actuated feed to over-ride the axial floating tap.
3. A completely stalled tap could be fractured during the counter-rotation phase because of the high starting torque of the induction motors.

In order to determine whether any of these weaknesses existed, the Gilman engineers realized the need for high-speed motion-picture photography to catch the action, and to see exactly what was happening. They called in Willim G Hyzer, of Janesville, Wis, a specialist in this field, and outlined this problem to him.

The sequence of the automatic operation takes place in three steps:

1. Drilling at a velocity of 7200 rpm
2. Tapping at 3600 rpm
3. Counter-rotation at 3600 rpm for removal of tap from work.

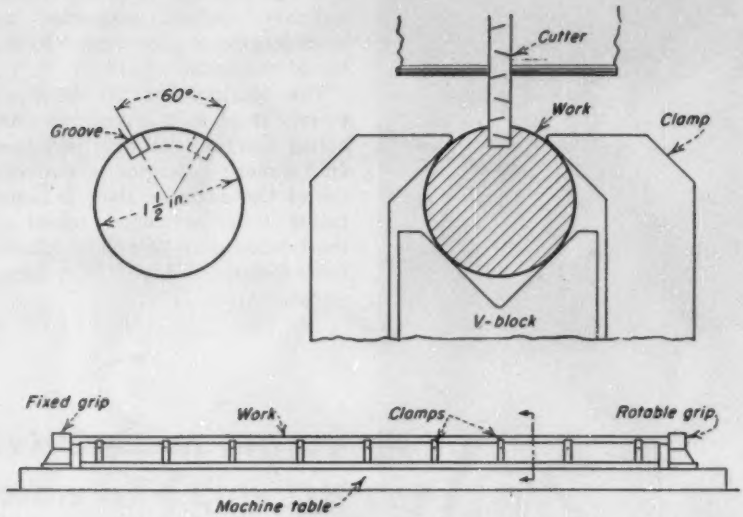
Eight chucks are fitted with axial floating tap holders and combination drills, and are cam-fed into the work. Each spindle is driven by a separate motor. The camera was set up for 3000 frames per sec, but no tap breakage occurred during the filming.

When the films were projected at normal speeds, the action was slowed down more than 200 times. Measurements were made from individual frames, resulting in the graphical analysis shown on chart. Timing marks on the edge of the 16-mm film made possible the precise determination of velocity and acceleration.

Performance characteristics of two typical stations, spindles 1 and 8, are identical until midway in the tapping phase. The chart indicates that spindle 1 nearly stalls out at this point in the operation. Tap breakage was associated with this stalling tendency of the drive motors. Further analysis disclosed that insufficient chip clearance in the taps caused a buildup of chips in the hole, resulting in tap seizure. Subsequent use of special taps employing high-helix flutes eliminated this difficulty.

Because of the high-speed motion-picture investigation, Gilman engineers were able to acquire a better understanding of their problem which eventually brought about corrective design changes in the machine.

Practical Ideas . . .



Ingenious Holding Method Helps Mill Helical Groove

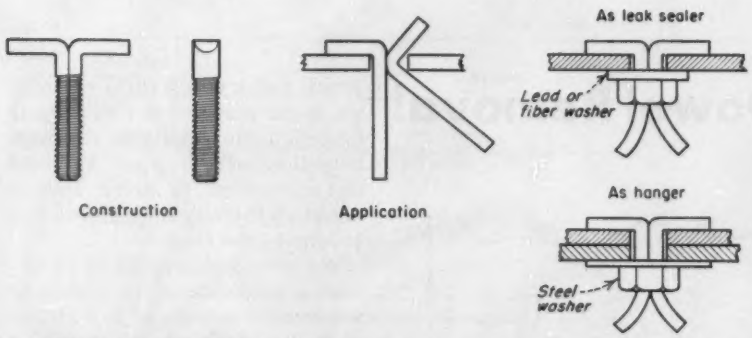
We had to cut slight helical groves in light alloy rods 20 ft long. The total included angle between the ends of the groove was 60°. Our spar-milling machine was long enough to take the work, but the problem was to rotate the bar during milling. Instead of turning the work, we decided to twist the bar. The twisting force was well within the permitted strength of the work.

At both ends of the rod are gripping fixtures, one fixed, the other rotable. Between the fixtures is a long V-block with side clamps.

The work was put in place, gripped on both ends, and twisted the desired amount. Then the side clamps were tightened, and the cut was made, at high speed and feed. When the work was released, it sprung back to its original shape, and the groove had the desired helical form. *A Vetsch, Steffisburg-Station, Switzerland*

Kick-Press Speeds Rivet-Cutting

We were using up a lot of surplus rivets, and found the rivets too long. Cutting to size with hand-shears was too long a job, so we set up a chisel in the ram of a kick-press. The anvil was clamped to a shoe, so its shoulder served as a length stop. With this method we could cut stock to 3/16 in. *Stanley Wencek, Boston, Mass*



Split Cotter Pins Do Variety of Jobs

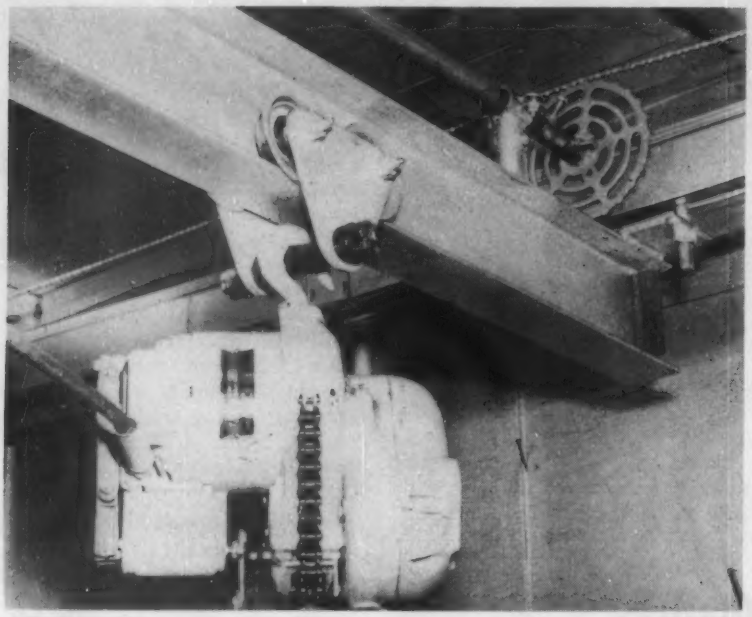
A split cotter pin can be threaded and formed as shown to do a variety of odd jobs around the plant. Examples of the work are emergency repairs of pressure and non-pressure containers, and for hanging brackets or attaching parts through blind holes.

To aid in threading the pin, the open ends may be tack-welded, and split after the threading die is removed. Then the pins can be used in a hole only slightly larger than the diameter of the pins.

To use the threaded pin, one half is put in place, as shown, and the other half is inserted, bent end first and the ends are brought together.

Of course, the same idea can be carried out with mild steel pins, which can be chucked together and threaded. There is a thickness limit on the parts being bolted, because the bend end of the formed pin will not turn through the hole if the parts are too thick. *Thomas H Duffy, Altoona, Penna*

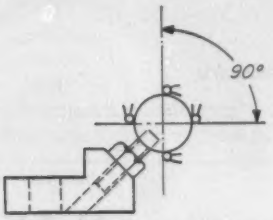
Ed note: There are available, on the market, devices for similar application, but such devices are usually somewhat larger than those shown here.



Bicycle Sprockets Help Small Crane Move Freely

Adaptable for moderate lifting, this shop-made crane has several interesting ideas. Its outstanding feature is that it travels without binding because of two bicycle sprockets and chains on the ends of the axle. The I-beam on which the hoist rides has a pair of wheels which roll within barn door hangers. The axle for the sprockets is ordinary conduit, supported by short lengths of pipe welded to the top of the beam.

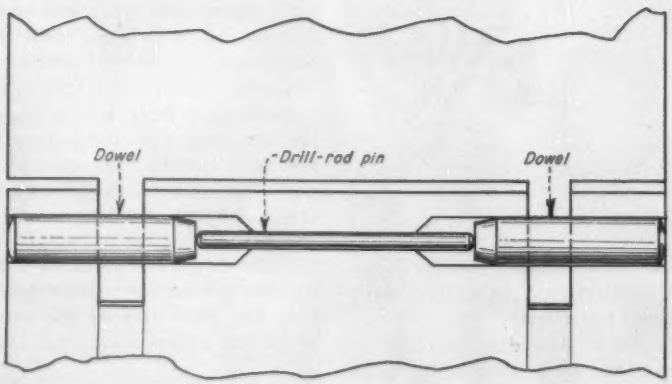
The bearings for the axle are merely short split sections of pipe bolted together. Another sprocket (not shown) is welded to the center of the axle, so that, at some future time, horizontal travel of the I-beam may be power-driven. *Bert Goldrath, San Mateo, California.*



45° Mounting Brakes Locating Ball Versatile

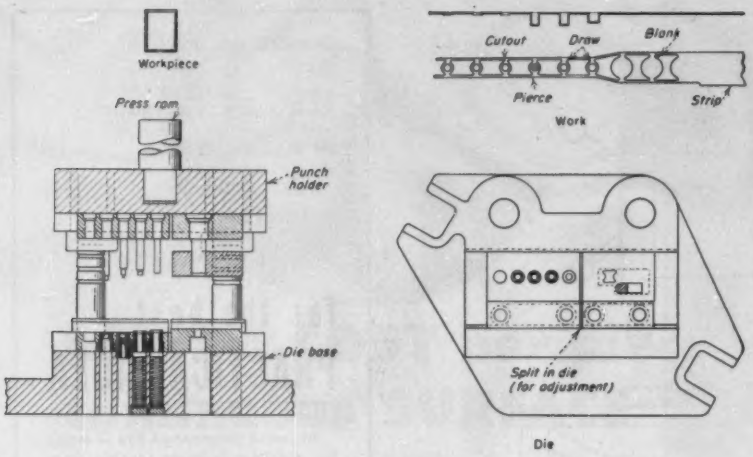
When mounted at 45°, as shown, a locating ball can be indicated from above, and also on either side. This method is very handy when doing jig-borer work, when holes have to be bored from three sides, or from different angles. *Chris Stougaard, Racine, Wis*

Drillrod Helps Dowel Removal



WHEN building a fixture recently, we found that dowel pins used as hinges couldn't easily be removed, once they were in place. It would be impractical to drive another dowel all the way through the hole to remove the hinge.

We solved the problem by allowing clearance at the bottom of the reamed holes, and put a piece of drillrod between the two short pieces of dowel which served as hinges. By driving one dowel down into the clearance, the other dowel is forced out, and can be removed. Then the short drillrod is taken out, and the remaining dowel is removed easily from the other side of the fixture. *John N Schwartz, Berrien Springs, Mich*



Five-Station Progressive Die Forms and Cuts Off Caps

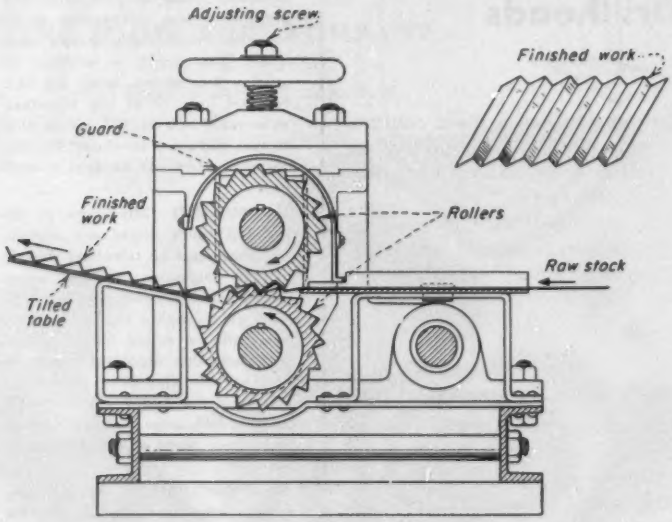
Blasting caps, which are made by the million, can be made in this five-station progressive die at the rate of about 4000 caps per hour, giving 30,000 to 32,000 caps in an 8-hour day.

With this die, sheet metal is fed in through a channel on the right side of the die, and registers against the cutting punch. This punch cuts a small tab out of the edge of the material, which tab then acts as a stop for further operations in the die.

The blanking punch cuts out the material, leaving two small strips attached to the stock, so the blank is held on the sheet. The draw is made by two drawing punches, one right after the other. Then a small hole is pierced in the base of the cap. The next punch cuts the cup off the stock.

This die is made in two sections, to permit adjustment of the center-to-center distance after the first draw. This dimension must be found experimentally, because it is not the same as the other three feedings.

The die works quickly and to close tolerances. *S E Olson, Minneapolis, Minn*



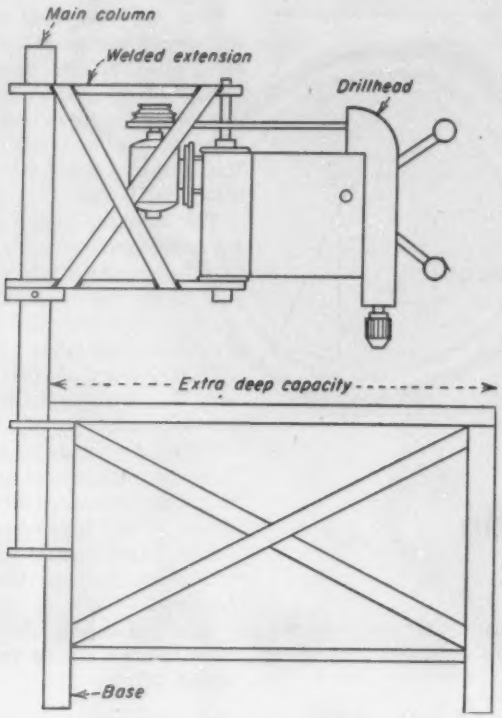
Adjustable Rollers Speed Corrugation-Forming

CORRUGATION is often done with a die and punch, with an automatic feeding mechanism. However, with the roller device shown here, it is possible to increase the rate of feed perhaps twenty or thirty times. With this machine we have corrugated hundreds of thousands of sheets a year.

Stock is fed into the rolls from the right, and goes between two guide rolls, and then between the corrugating rollers. The upper roll is adjustable vertically. A sheet metal cover protects the operator from hand injury.

The key to the success of this device is the tilted table at the discharge end of the corrugating rollers. If this table were not tilted, the sheet would tend to come out of the rollers in a sort of semicircular shape.

Speed of the machine can be changed as desired, and the forming rollers can be changed to provide different types of corrugation. *H Dahl, Upplands Vasby, Sweden*

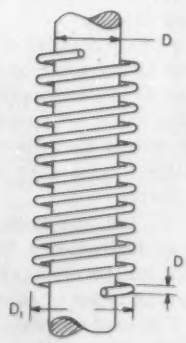


Extensions Added to Drillheads Speed Plate-Drilling

We had been drilling quite a few holes in large aluminum plate, a job which required the capacity of our radial drills. To free the drills for more appropriate work, we purchased two drillheads (without base or table) and mounted these heads on welded extension tables.

The extension has a main column on which the drillhead pivots, so the drill may be moved back toward the column.

This arrangement provided a drillpress with necessary width, at very reasonable cost. *Henry George, Bronx, NY*



Formula Aids Spring-Winding

Unable to find the answer in our handbooks, we developed a formula to compute springback of springs wound over a base shaft.

The formula:

$$D = (D_1 - d) \times 0.75$$

gives very good results. D is the desired shaft diameter, D_1 is the desired OD of the finished spring, and d is the diameter of the spring wire. *Federico Strasser, Santiago, Chile*

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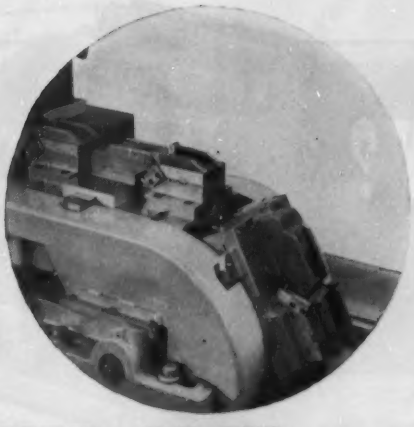
JUDGES—A group of 200 *American Machinist* readers is asked to select preferred articles in each issue. The group is a true cross-section of all readers, and changes entirely each time. Their votes, in addition to guiding the editors, select the best Practical Idea. If at any time their votes result in a tie, $25 will be paid to each and every co-winner. Decision of the readers will be final in each case.

REQUIREMENTS—Only items in the Practical Ideas pages are eligible, and they must be submitted directly by the originator. Do not worry about your shortcomings as a draftsman, photographer or author—every item will be edited in accordance with *American Machinist* standards and suitable illustrative or explanatory material added where needed. Readers will judge only the finished product—in terms of its usefulness to them.

WHO MAY ENTER — Anyone may enter except employees of the McGraw-Hill Publishing Co, Inc, and those of advertising agencies or departments. Suggest to your employees that they submit ideas.

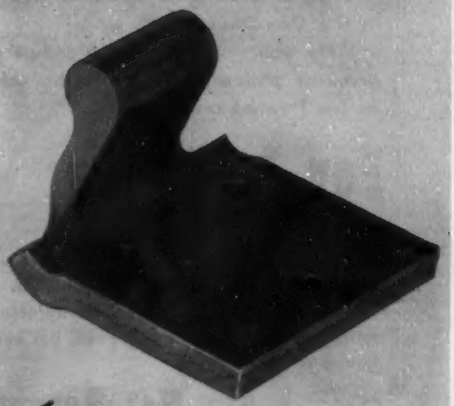
HOW TO ENTER—Send your entry to "Practical Ideas Editor," American Machinist, 330 West 42nd St, New York 36, N Y



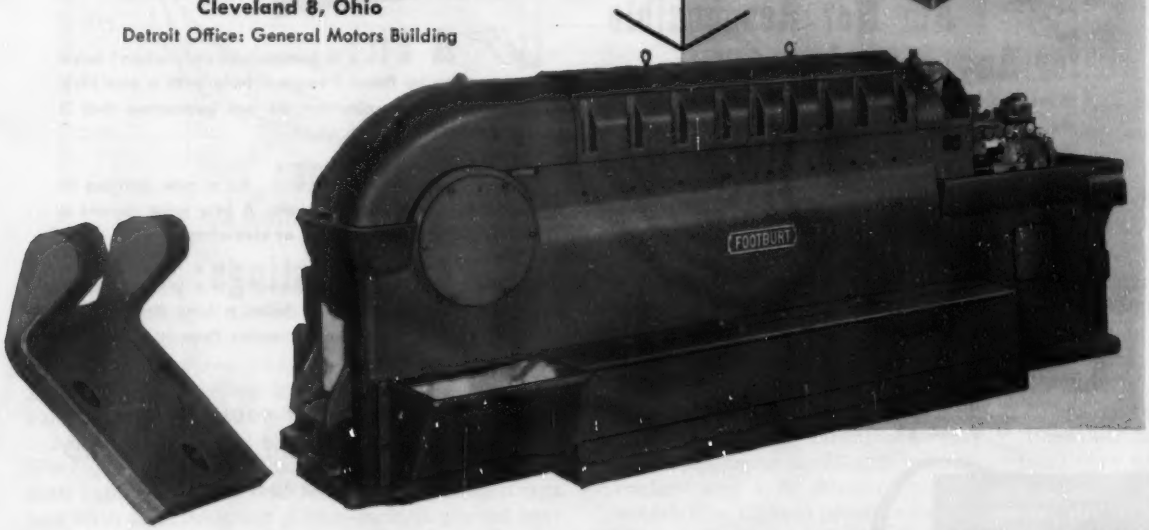
• Holding fixtures are designed for quick, convenient loading, with automatic clamping and unclamping.

LOWER COST per piece with continuous SURFACE BROACHING of small parts...

• In many plants where large quantities of duplicate metal parts are being machined, substantial savings are being made through the adoption of surface broaching. Production is exceptionally high, close tolerances are maintained, and tool maintenance costs are much lower than with ordinary methods. Foote-Burt engineers, pioneers in this advanced machining method, have had a wide experience in applying surface broaching in many fields.



THE FOOTE-BURT COMPANY
Cleveland 8, Ohio
Detroit Office: General Motors Building



engineered for production

FOOTBURT

MACHINE TOOLS

GEARS NOISY?
...Of Course

The Gear Business has always seemed to attract colorful and positive characters. Like George B. Grant, the Dean of Gear Makers in the Gay Nineties.

Sixty years ago he gave industry a few gems of philosophy in what he referred to as his Treatise on Gears.

For Instance:

"Noise: at a high speed is unavoidable. Fibre gears are quieter and softer than metal, and raw-hide is still quieter and less durable. Raw-hide and fibre are good at high speed, but unsuitable for heavy strains.

I Am Not Responsible for Any Mistake: even if I make it myself, if it could have been prevented by sending me working drawings or good sketches. If you make me guess, you must take the responsibility. A poor drawing is better than none.

Unless Otherwise Described: every gear ordered is a cut spur gear of cast iron, and it will have such diameter, pitch, face, hole, hub, and quality as I happen to think most desirable. Describe what you want and that you will get, but if you omit any detail I may write to you for the information required or I may guess at it and go ahead.

A Fit: is guaranteed only when I have the parts to be fitted. I ream a hole with a one inch reamer, for example, but do not guarantee that it will fit your one inch shaft.

Estimates: As a rule nothing is saved by getting an estimate. A low price means a cheap piece of work, here or elsewhere.

Steel Castings: are generally full of blow holes, and it takes a long time to get them. A cast iron gear of wider face is as strong and cheaper."

If Mr. Grant could only have run a sound test on RED RING Shaved Gears.

6778

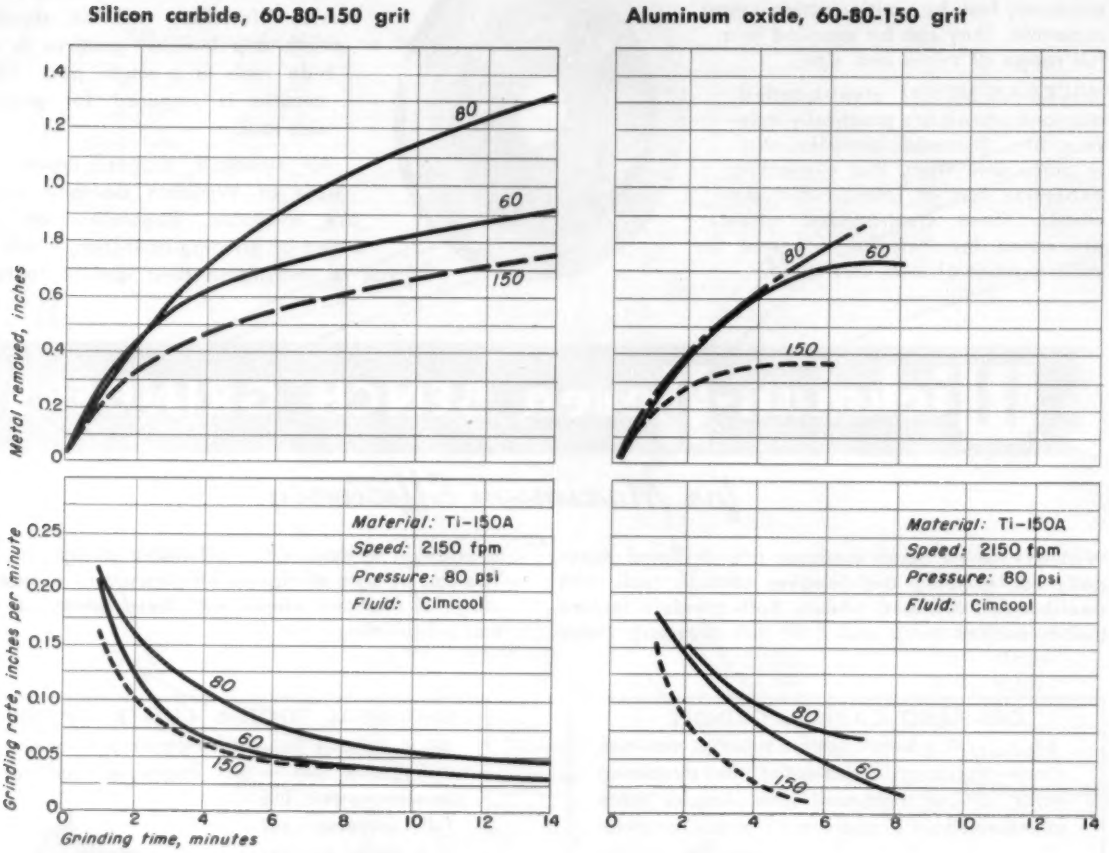
NATIONAL BROACH & MACHINE CO.

5600 ST. JEAN . . . . . DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

Belt Grinding of Titanium...I

Source: United States Air Force Machinability Report, Vol. 3, published 1954 by the Curtiss-Wright Corp.



Belt-grinding tests were made on three titanium alloys—Ti-150A, RC-130B and MST 3A1-5Cr, and also stainless and CR steel. Two types of (wet) belts were used, in three grits, at speeds from 1000 to 10,000 fpm, at various feeding pressures, and with various coolants.

Abrasive. Belts used were Behr-Manning's "Speed Wet Durite" (silicon carbide) and "Metalite" (aluminum oxide) in 60, 80 and 150 grit. The 80-grit was best with both belts but silicon-carbide proved better than the aluminum oxide.

Belt Speed. Low speed is necessary in grinding titanium alloys. Hence, after preliminary testing at 10,000 fpm (serious burning) and 6000 fpm (erratic grinding results), further tests were made in the 1000 to 3000 fpm speed range, with a heavier feed pressure and a coarser (60-grit) belt. By reference to the charts and comparing the run at 2150 fpm under these conditions with earlier runs, one sees that 1500 fpm gives the best over-all results.

Grinding Pressure. Runs were made at arbitrary feed pressures of 80 and 120 psi for belt material, grit and speed tests. Pressures of 40 to 160 psi were then used as test variables at speeds from 1500 to 5000 fpm, using an 80-grit belt, a chemical type of coolant and a 50-durometer, solid-rubber contact wheel. The highest pressure removes the most metal, but at a sacrifice in belt life. A metal contact wheel. was used for a few tests, but it provided little gain in stock removal and grinding rate, while causing considerable noise, vibration, poorer finish and higher power consumption.

Coolant Selection. All tests were run with a chemical type of coolant (Cimcool) diluted 100:1 with

Wickman DIAMOND WHEELS

(RESINOID-BONDED & STEEL-BONDED)

for Free Cutting... Quality Grinding... Longer Life

WICKMAN resinoid-bonded diamond wheels are recommended for use where extremely fast, free cutting action is most important. They can be supplied in a full range of types and sizes.

WICKMAN-NEVEN steel-bonded diamond wheels are practically indestructible. Diamond particles stay in place until worn, thus eliminating expensive loss of unexpended diamonds. These steel-bonded wheels are noted for their long-life and the extra number of tools they grind.

WICKMAN steel-bonded chip breaker diamond wheels have an unusually long service life. They will cut standard depth chip breaker grooves in carbide tools *in a single pass.* 1½-2 minutes is required for average size tool.

All standard shapes, types, and sizes of Wickman diamond wheels are available. Regardless of your cutting or grinding operation, it will pay you to investigate their quality features.

Wickman-Neven BENCH GRINDERS

for Maximum Efficiency

Wickman-Neven bench machines are designed especially for grinding and lapping carbide tools with steel-bonded diamond wheels. Both grinders feature built-in coolant pump and 1-HP full reversing motor in addition to many other advanced design features. You can be sure of highest efficiency and economical usage of diamond wheels with these bench machines that cut grinding costs.

OFF-HAND CARBIDE GRINDER

Model GG-2 bench machine provides maximum convenience, accuracy and speed when sharpening either left- or right-hand tools. Angular table adjustments from 5° above to 15° below horizontal can be quickly made. Compactly built (16½" wide x 26½" deep x 16½" high) this sturdy grinder will give many years of heavy duty service.

UNIVERSAL TOOL & CUTTER GRINDER

Model GG-3 has a swiveling motor head and a swivel table with vertical, longitudinal, and transverse movement. This fully universal tool and cutter grinder can be utilized for cutting off, chip breaker grinding, or general tool grinding. Standing 31¾" high, this grinder requires a 30" x 30" table area.

THE Wickman MANUFACTURING CO.

10325 CAPITAL AVENUE

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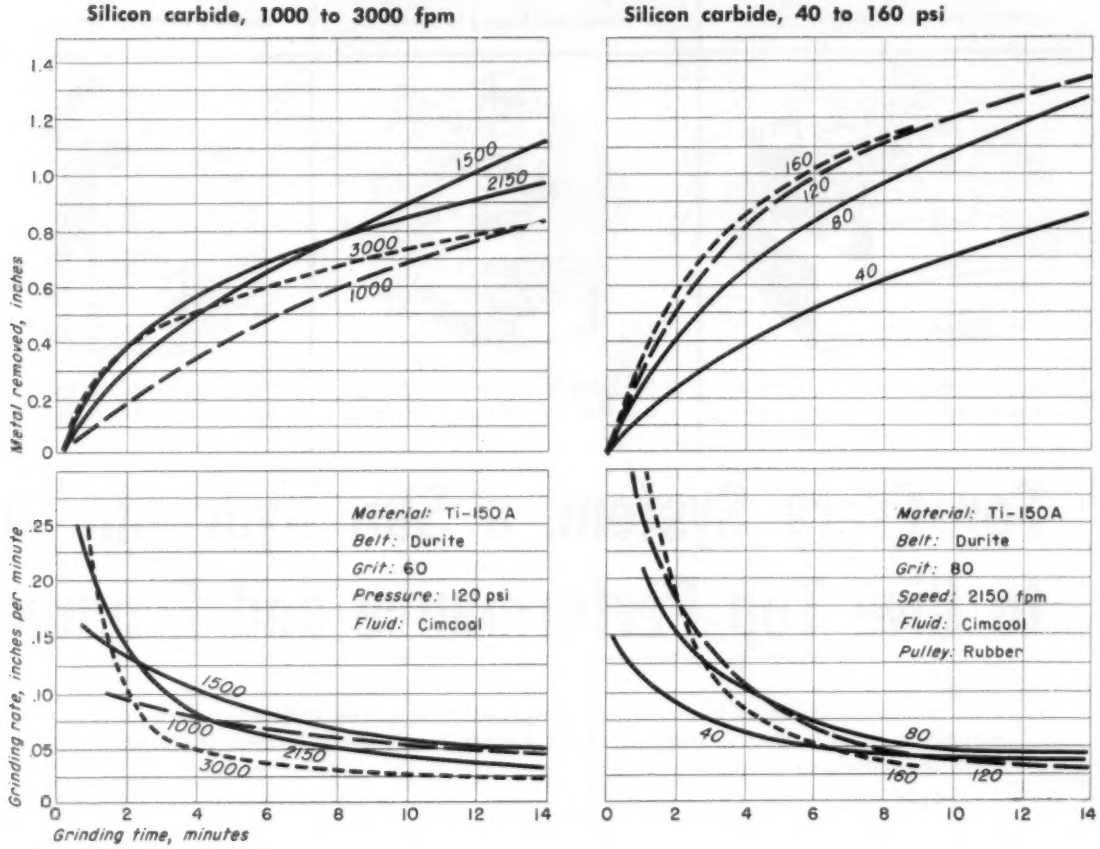
Belt Grinding of Titanium...II

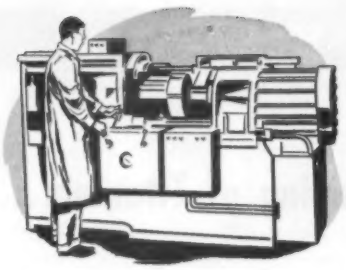


water. Four other materials were likewise briefly evaluated. Houghton's "Cut-Max 206" proved best. Houghton Grind 35 diluted 11:1 gave performance about equal to Cimcool, while PD 940-D diluted 10:1 was better than Cimcool, but poorer than Cut-Max. Liquid Co_2 proved the least effective.

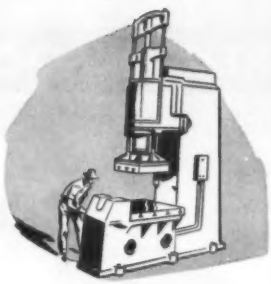
Power Consumption. As expected, power consumption in grinding titanium alloys varies in direct proportion to grinding pressure. Power data are based on tests with a ½ in. wide by ¼ in. high specimen. Naturally, the power consumption to grind a substantially larger surface would be some function of the width and height of the workpiece. This relationship was not determined. Infeed pressure will also influence the power required.

With most belt grinding, feed is by pressure and it is not positive in a geometric or mechanical sense. The test piece measured 0.125 sq in. It can be assumed that eight times as much power would be needed to grind a piece ¼ in. high by 4 in. wide (one square inch). So unit power is here expressed as: horsepower per square inch of contact divided by the cutting rate (penetration) in inches per minute. In effect this reduces to the familiar hp/cu in./min.

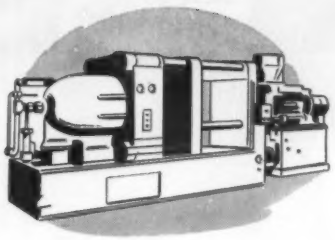
Surface Finish. Because a new belt gives the roughest surface on the work, profilometer readings were taken on various test samples, to determine the rate at which the belt wears or becomes smooth. The over-all effectiveness, or life, of a belt is then a function of the product of surface roughness and the time of grinding, and is proportional to the area under curves. These show that 40-grit belts have good durability and produce good finish after a few minutes of grinding.



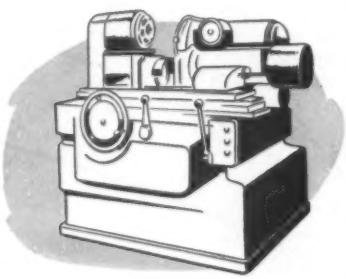
For hydraulic systems on all types of injection molding machinery.



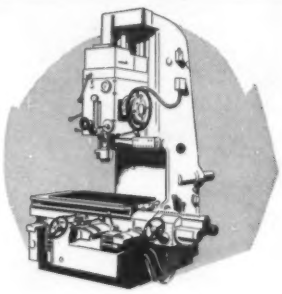
For hydraulic systems on all types of presses and forging hammers.



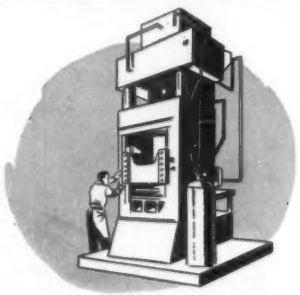
For hydraulic systems on all types of plastics molding equipment.



For hydraulic systems on grinding machines and other production tools.



For hydraulic systems on jig borers and other metalworking machinery.



For hydraulic systems on standard and special heavy-duty forming presses.

For Every System, a Sun Hydraulic Oil to Give Top Performance and Economy

Sun makes a variety of hydraulic oils, because *no single oil will meet all combinations of conditions economically*. Among the many hydraulic oils made by Sun the following cost-cutting products are typical.

SUNTAC OILS. Designed to cut leakage. They reduce it an average of 35%—and results are immediate. But they wouldn't be economical in a tight system.

SUNVIS H.D. 700 OILS. Clean dirty systems in 50 hours or less without loss of production. But they wouldn't be economical in systems that leak badly.

NEW SOLNUS OILS. Resist oxidation, prevent rusting and corrosion. They are low in cost and have long service life. But they wouldn't be economical in systems where excessive contamination is a problem.

Among the many different hydraulic oils made by Sun, there's one that's best for your system—a hydraulic oil that will give top performance at lowest possible cost. Consult your local Sun office or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. AM-6.

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

SUNOCO®

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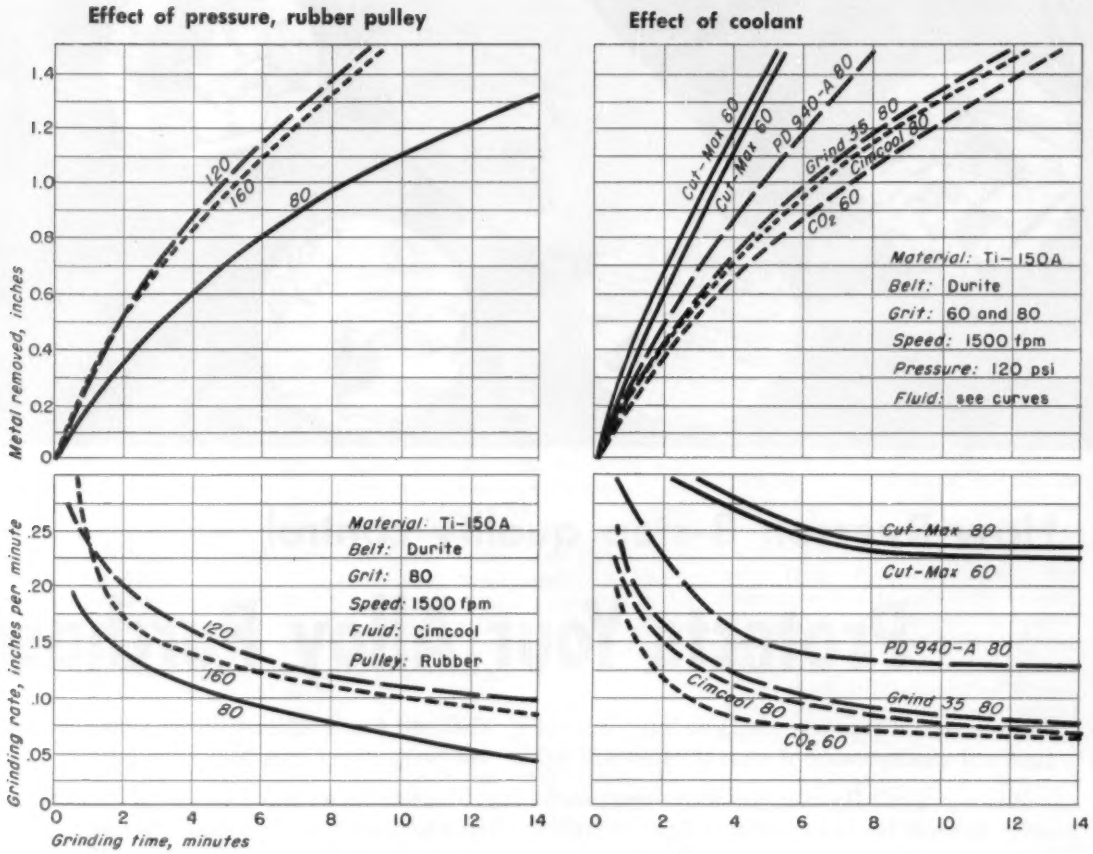
Refiners of the famous Blue Sunoco Gasoline and Dynalube Motor Oils

Belt Grinding of Titanium...III

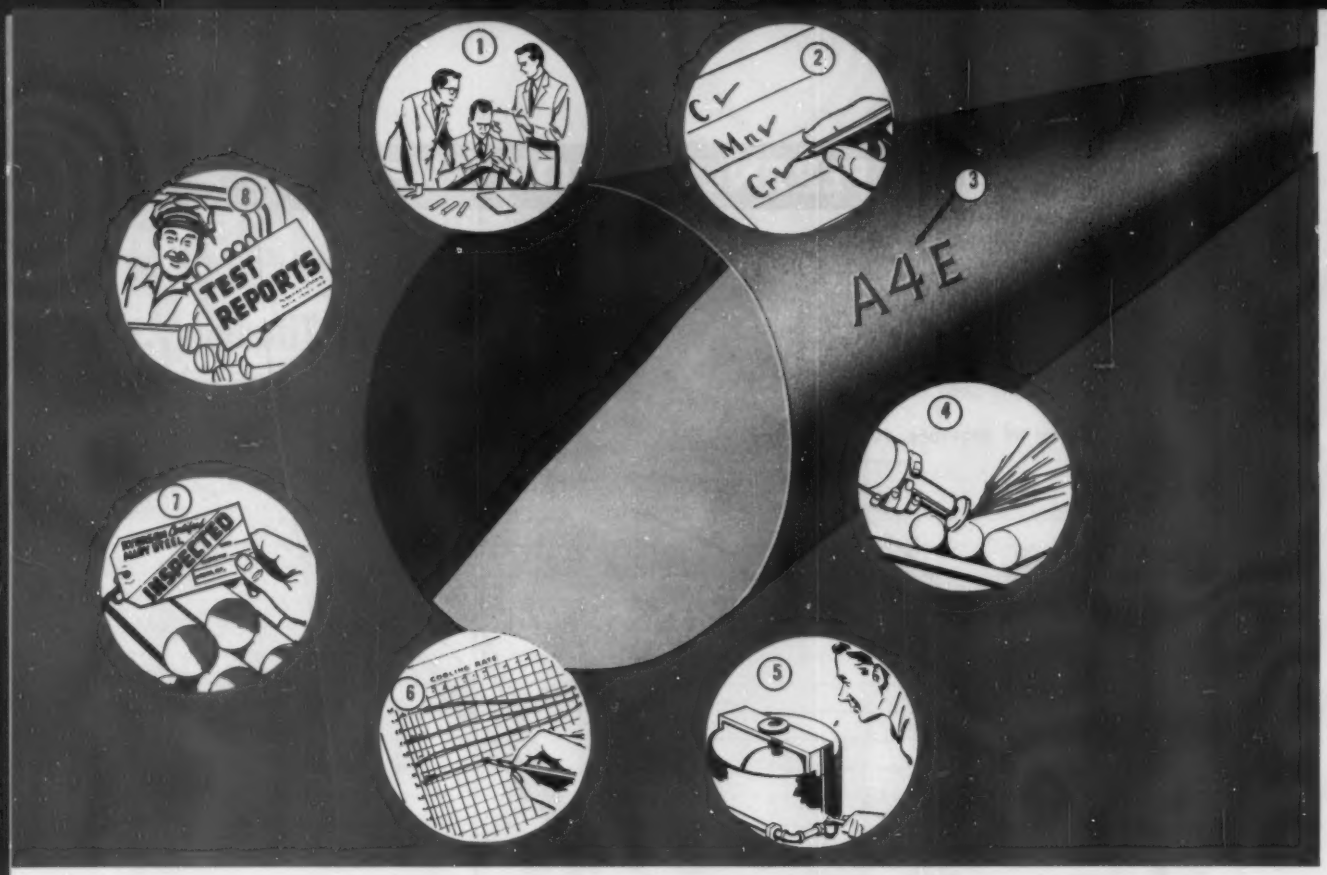


Carbon Content. Complex carbides in titanium alloys appear to be a major reason for poor grinding performance. The medium-carbon RC-130B and the Ti-150A alloys belt grind about the same. Here, a change from an 80-grit to a 60-grit belt makes more difference than variations in carbon content. The standard MST-3A1-15Cr alloy (a high-carbon type) grinds poorly. Note: an experimental form of 3A1-5Cr with 0.09% carbon gave excellent results comparatively speaking.

Steels. For comparative purposes, belt-grinding tests were made on AISI 431 stainless and AISI 1020 cold-rolled steels. Cimcool and Cut-Max were used as coolants. Silicon-carbide and aluminum-oxide belts in 80-grit were used at speeds of 1500 and 6000 fpm. Best results were obtained with Cut-Max at 6000 fpm, using a Metalite belt and 80 psi feed pressure. Results indicate that steels can be ground with twice the belt life obtainable on titanium alloys.

In belt grinding the 431 stainless steel, the higher speed of 6000 fpm produced far better finish and belt life than at 1500 fpm. Stainless steel also requires far less power to grind than MST titanium alloy, even when ground at four times the rate of stock removal.

The information so far obtained on belt grinding of titanium is fragmentary. Obviously, the total area of abrasive surface available and the area of the work surface influence belt life. All tests were made with a 54-in. belt. A great deal of work could be done to determine the effect of (a) the length of the belt-work contact area and (b) the effect of the belt-length, contact-length ratio. Limited titanium supply prevented such studies.



How Ryerson 8-step quality control

Protects Your Alloy Purchase

Are you sure of the alloy steel you buy? Sure of type and quality—sure of what the steel will do?

When you call Ryerson for alloys you can be sure—because Ryerson, and only Ryerson, takes eight separate and distinct steps to protect you against the many slips that can occur before the steel you order reaches your plant.

First, to assure you alloys of highest quality, we carefully select each heat to be carried in Ryerson stock [1] —verify the analysis as soon as a heat is received. [2] Next, for permanent identification, we stamp each bar with its particular heat symbol [3] —color mark it according to type. Then, to guard against mixed steels, we spark test every lift of bars from each heat. [4]

Meanwhile, we test a sample of every heat for hardenability [5] and interpret the test results for you. [6] So, finally, when you call Ryerson for alloys you can be sure. Tested steel—racked separately by heats—is prepared to your order; given a final inspection [7] and rushed to your plant. And with your steel (as-rolled or annealed), you receive complete test data [8] to verify quality and guide heat treatment.

This 8-point quality protection is yours at no extra cost. Just call your nearby Ryerson plant.

Principal Products: Carbon, Alloy & Stainless Steels—Bars, Structurals, Plates, Sheets, Tubing, Machinery & Tools, Etc.

RYERSON STEEL

RYERSON CERTIFIED STEELS

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CINCINNATI • CLEVELAND • DETROIT
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Talking Shop . . .

Russian Observations

WHILE THE RUSSIANS do have an automatic machine that starts with aluminum ingot and delivers greased and wrapped finish-machined automotive pistons, this is one of only 40 automated setups in the Soviet Union —or so says a Czech engineer with whom we recently talked. He says the Russians have plenty of design-engineering and development skill, but the major problem is to progress beyond the pilot-plant stage. They have problems with producing their equipment, once it is designed.

Another point he makes is that the Russians tend to talk about new developments as soon as designs are completed; they don't wait for the finished product to prove out in use. Among other reasons, he quotes the lack of competition—so a scientist or designer can talk quite freely about his new idea without fear that a competitor will grab the idea and run. Further, it's quite all right—to a Russian—for an automated setup to produce pistons and an archaic hand-chipping operation to rough-finish cylinder blocks beside it. There is no feeling that such conditions are incongruous, no driving urge to modernize the hand operation immediately. . . . And there's little or no understanding of maintenance (let alone preventive maintenance) so new equipment promptly becomes old and inaccurate anyhow. That isn't too important, because the Soviet Union is getting equipment and materials from its satellites on a continuous basis. Satellites are not allowed to trade among themselves, but only with Moscow—at prices set by Moscow. Then Moscow resells to world markets. Goods and equipment received in exchange go into Soviet plants, and the worn-out stuff it replaces is shipped to the satellites. . . . If this philosophy is true, the way to separate a satellite is to make it unprofitable to Moscow.

Centering Device

DISKS OF ALUMINUM, copper, and other metals to be spun can be purchased directly from materials suppliers at a considerable saving. To locate a small center hole in such disks, one company has developed a fixture with three arms 120° apart. Each arm carries a dog, and is mechanically interconnected with the others on a collar so rotation of the collar brings in the arms and centers the disk under a punch.

Split the Time

TWO MACHINISTS halved time required to change bearings in the 150-hp electric motors in huge cranes at Colorado Fuel & Iron Corp steel mills in Pueblo, Colo. Chris Lynch and Jess Kenner created a time-saving split bearing to fit the big motors. The motors power giant cranes, with 50-ft booms, used to handle mountains of ore and lime rock. The split bearing can be removed and replaced by two men in less than two hours. It formerly required 9 men 6 hr.

London Lock

AN OLD, IRONBOUND GATE, originally from London's Newgate Prison, now bars a narrow alley between two buildings in Buffalo, NY. Of massive oak lattice, weighing 1800 lb, it led from the condemned cell directly to the gallows. The last time it was opened for an execution was in 1868, but before that it was in frequent use. No less than 72,000 condemned prisoners passed through it in the reign of Henry VIII alone. One of its features is the huge lock, measing 21 × 14 in. This was built by the great locksmith and inventor Bramah, and is said to be so intricate as to defy even the most expert modern locksmith to open without the key. Its cost, in the late 1700's, was £111—in modern values, probably $2000—an enormous sum for the time.

Newgate prison had a long and bloody history, and when it was finally demolished in 1903 it had stood for over a thousand years. Records show its rebuilding in 1492 by the executors of "Dick" Whittington, its serious damage in the Great Fire of London, and rebuilding in 1666, and further damage by fire in 1780. Certain of the relics were sold at auction in 1903, and the gate was bought by the father of the present owner and brought to Buffalo over the loud protests of the London Daily Telegraph.

Hungary Saves Nickels

HUNGARY is power-short to such an extent that large-scale research has been carried on to reduce power consumption during light cuts on machine tools. A control switch has been developed to follow motor load automatically, cutting current as load goes down. On a test lathe, this cut average current consumption 20%. . . . At the R M Machine Tool Works, Budapest, milling cutters are "coated with a hard metal by way of an electric spark," increasing tool life eight times. Many other method improvements are claimed, such as threading spindles on a lathe to better finish in 40% of the previous time, precision casting of turbine blades and other parts to save steel, and cutting construction time on a locomotive boiler from 24 to 12 days, a turbo-generator from 12 months to five.

News of Metalworking . . .

ATOMIC ELECTRIC POWER: a Tough,

AEC'S authorization to Westinghouse to build the nation's first atomic power plant opens the doors to competitive atomic electric power, and to a vast new market for industrial machinery and equipment. But it's going to take a lot of groping in the dark before industry comes up with equipment that will fill the bill

WASHINGTON—Purchase contracts have already been signed for equipment to go into the nation's first utility-size atomic electric power plant. Within the next five years, such purchases will run into the hundreds of millions of dollars, opening a tremendous new market for industrial and electrical machinery and equipment.

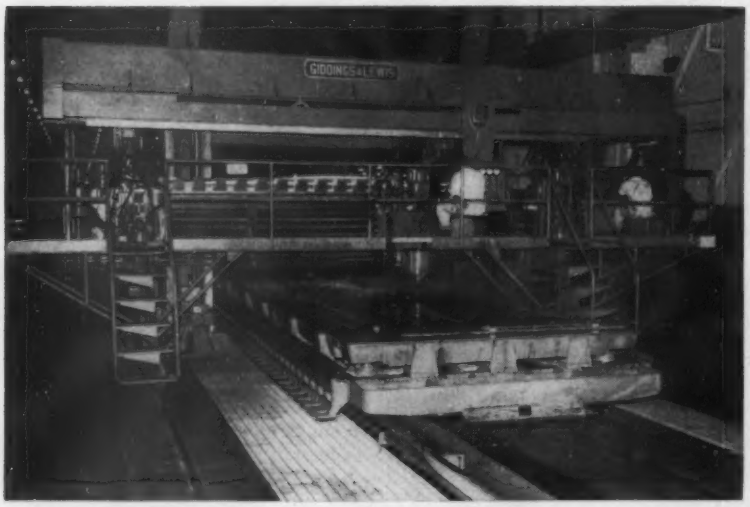
Today, with atom power an accepted thing, the electric utilities and equipment manufacturers are debating what type of atomic firebox (reactor) offers the surest and most economical method of producing steam to turn the turbines of US industry.

The Atomic Energy Commission is going ahead with experimental models of the five reactors that offer the most promise. And in the next five years, AEC plans to spend $200 million putting pilot plants into operation.

But private enterprise shows no signs of waiting for a final answer before plunging into the atom power business. Many leading utilities and electrical equipment manufacturers have made their choice of reactors and are ready to strike out on their own. For the time being, private enterprise is legally barred from owning an atomic power plant, or the nuclear fuel to fire it. But Congress is already revising the law.

Westinghouse Electric Corp, which is building the first reactor, has already let contracts for some equipment requiring long-term delivery dates. Equipment already bought, or about to be bought, includes:

- **Steam generators** (to receive heat from the reactor core and turn it into steam to run the four turbo-generators of the 60,000-kw plant)—two each from Foster-Wheeler and Babcock & Wilcox.
- **Single-stage centrifugal pumps,** driven by canned-type induction motors, to be made by Westinghouse.
- **Gate-type stop valves** for the cool-



OPERATORS STRADDLE WORKTABLE of the G & L combination spar and skin mill, directly over cutter positions, as 40-ft worktable slides back and forth over 90-ft protected ways. Troughs on each side flush chips into salvage pit

CONTROL STATIONS are (left) to control cutting heads, and (right) to control amount of power used

Spar-Skin Mill Machines Entire Plane

EL SEGUNDO, CALIF—A combination spar and skin milling machine, so big it can machine entire aircraft sections from aluminum plate 40 ft long x 10 ft wide, is now in operation at Douglas Aircraft's plant here. The machine tool, the G & L Hypro 100, was custom-built for Douglas by Giddings & Lewis Machine Tool Co, Fond du Lac, Wis. The 90-ft-long, 30-ft-wide, 26-ft-high, 250-ton mill is operated by only two men, can achieve tolerances of 0.0015 in. In the milling of a typical wing section from 2-in. plate, 8 ft long x 4 ft wide, the

Tricky Equipment Market Opens

ant circuit, some designed for remote operation. Prototype on order from the Crane Co.

The pipe system for carrying heat from the fire box to the steam generators will be approximately 18-in. OD, and will likely be fabricated from rolled and welded stainless steel plate.

Specifications for these and thousands of other units that will go into this first atomic power plant require drastic departures from time-tested components of conventional coal, oil and gas-fired generating plants. Many unexplored radiation problems make equipment manufacture in this field largely an exploratory process.

Charles Weaver, who heads the AEC-Westinghouse atomic power project tells this story about the difficulty of estimating costs for the atom power plant:

"Recently we obtained from the nation's most competent vendors fixed-price sealed bids on the steam generators, and also on a prototype main coolant valve. Both bid invitations were based on complete performance specifications.

"The bids received on each component varied almost 5 to 1."

With such variations in prices for the more conventional pieces of equipment, it is clear that cost estimates on highly experimental items are not estimates at all, just guesses.

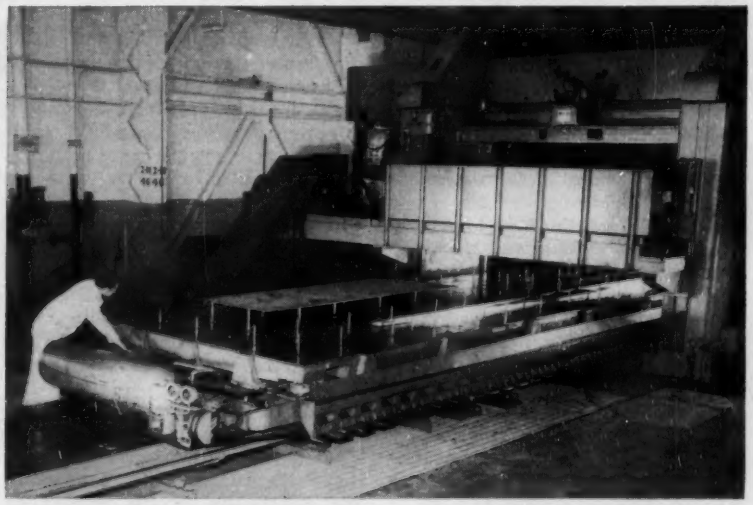
But this advice from a man who is actually building a power reactor doesn't discourage other large manufacturers from going ahead with their own long-range cost estimates on power reactors.

In the case of the Westinghouse plant, the design is based on two atomic submarine engines the company has built, one of which has been operating for at least a year. Operating experience for other types of reactors has been gained only from small models.

But in the brand-new field of industrial atomic power plant design and manufacture, work is going ahead on experimental models of reactors. A private industrial group headed by Dow Chemical Co and Detroit Edison may get far enough along this year to let contracts for some equipment for its own fast-breeding reactor. But this will be mainly for testing purposes.

Lawrence Hafstad, director of AEC's Reactor Division, thinks nearly all equipment for the reactors is unique, requiring specialized engineering and design. And Dr. Chauncey Starr, who heads North American Aviation's atomic projects, believes at least two-thirds of the equipment will require specialized engineering.

MOBILE STRADDLE BRIDGE allows operator to keep close watch on any or all of machine's three cutting heads



REMOVING THE FINISHED JOB is accomplished easily with special pneumatic lifters. Vacuum chucks hold part in place. Completely welded table is made up in two 20-ft sections, reducing table weight and increasing sensitivity

Sections in a Single Operation

number of parts required were cut from 29 to 1, and 1300 rivets were eliminated. Machine has three Onsrud cutting heads, automatically guided by a templet or pattern which directs the carbide teeth at speeds up to 7200 rpm in milling intricate airframe sections. One head is universal swiveling, has automatic twist control. The 40-ft worktable moves on rails at 150 ipm, is straddled by a portable catwalk. Mill has 12 motors with a total hp of 350, plus a 20-hp motor for driving the worktable, and several smaller motors.

Engineers Talk New Tooling at Purdue

Machining of titanium, weldment production, and automation in Metalworking were chief discussion topics at Purdue University's Tool Engineering Conference, when 200 top operating men and engineers met to talk over Metalworking's toughest tooling problems

WEST LAFAYETTE, IND—Titanium held the spotlight at the Tool Engineering Conference held here May 22 by Purdue University's Dept of General Engineering in conjunction with the Indiana Council, ASTE, and Purdue's Division of Adult Education. Featured events were panel discussions of developments in the production of weldments, machining of titanium, and the application of automation to metalworking plants and steel mills.

Headline speaker Herbert L Tigges, executive vice-president, Baker Brothers Inc, and president National Machine Tool Builders' Association told the more-than-200 production executives and tool engineers that "to achieve needed increase in productivity, and to decrease cost of their product, managers of metalworking plants must carry on a continuing modernization of production facilities."

In line with this thinking, Mr Tigges cited the 1953 *American Machinist* Inventory of Metalworking Production Equipment, which he said points up the fact that modernization of production facilities must be increased if the United States is to continue to prove that its citizens can get more of the things they want in return for the work they do under a free competitive system than they can under any communistic or socialistic system yet devised.

Machining Titanium

In discussing the machining of titanium, Prof L V Colwell of the University of Michigan's Dept of Production Engineering showed slides comparing chips produced when cutting Type 304 stainless steel, SAE 1020 and SAE 1045 steel, with those of several titanium alloys. He explained why titanium chips are thinner and cause more rapid tool wear than do chips cut from steels.

According to Professor Colwell, when tools are sharp, single-point cutting forces to machine titanium are one-third to one-half those needed to cut mild and stainless steels. Thickness of titanium chips produced are about equal to feed rate. The best coolant yet tried, he said, is sodium nitride in water. When drilling, best results are obtained with sharp, short drills—particularly with a wear-resistant surface treatment.

In Professor Colwell's opinion, the most critical titanium machining operation is tapping. This, he said, is in a large measure because of work hardening of the wall of the hole when it is drilled. In tapping titanium, return torque often is several times tapping torque and frequently may cause tap breakage. Seemingly minor changes in cutting fluid result in considerable variation of both cutting and return torque values when tapping.

Titanium Chip Formation

During the same session, E J Krabacher, senior research engineer, Cincinnati Milling Machine Co, showed film closeups of chip formation taken at speeds up to 7500 frames per second.

Mr Krabacher's film and the slides shown by Professor Colwell both indicated that cutting forces are lower and chips are thinner in the machining of titanium mainly because the shear angle in titanium is higher than in the steel chip, and shear energy is somewhat lower.

Tests conducted at Cincinnati Milling indicate that tool-chip interface temperatures for Ti 150A are approximately twice those for SAE 1112 steel. In addition tool-chip contact area is slightly less.

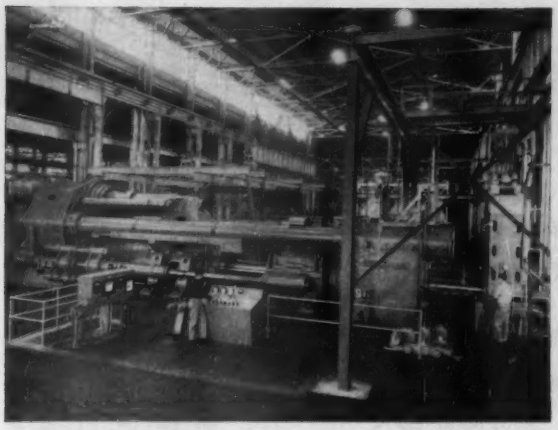
Other tests reported by Mr Krabacher show that high-speed steel and cemented-carbide tool materials are soluble in titanium at elevated temperatures. Cast-iron cutting grades of cemented carbides are considered better suited for machining titanium than are the steel-cutting grades.

Using a closed television circuit to bring to the lecture room action views of shop operations—a system devised by Professor Lascoe of Purdue and first used publicly at the ASTE-University of Pennsylvania Carbide Seminar in Philadelphia last month (*AM* May 10/53 p186), Dr Leo P Tarasov of Norton Co compared the extremely white spark and rapid wheel wear experienced when grinding titanium at conventional wheel speeds, with the cooler sparks obtained when grinding steel.

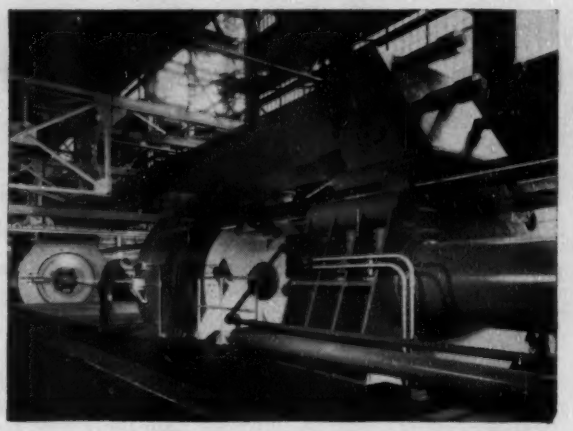
Dr Tarasov said that when titanium is ground with aluminum-oxide wheels, peripheral speed should be reduced materially — to 1500-2500 fpm. The slower wheel speed will reduce wheel wear as much as 50 times, he said, adding that the wheel should be flooded with a coolant (a 10% solution of a good rust inhibitor in water is good), and slow cross-feed and table-traverse rates should be used. Similar conditions should prevail, he said, for external and internal cylindrical grinding with aluminum-oxide wheels.

Silicon-carbide grinding wheels can be used at conventional (6000 fpm) speeds when grinding titanium, according to Dr Tarasov. But they must be flooded with a light grinding oil. This practice is a fire hazard, however, and most titanium fabricators are using adjustable-speed-spindle grinders that allow aluminum-oxide wheels to run at low speeds. In most cases 60-to-80 grit aluminum oxide wheels produce best results.

Reporting on recent tests of punch-press piercing forces when blanking steel and titanium parts ⅛-in. thick, Hans Coster of Purdue's Manufacturing Processes Dept said little difference had been observed between results obtained when piercing the two materials. But, he said, larger die clearance (about the same as for brass) seems desirable when piercing titanium. Force required to pierce a hole with a moving punch, Mr Coster said, is about 25% greater than the estimated shearing force obtained by usual calculations.



14,000-TON EXTRUSION PRESS has three rams on vertical centerline: center ram of 8300-ton capacity and top ram of 2850-ton capacity are visible; bottom ram (2850 ton) is below floor. Four columns 57 ft long are on 118-in. centers to permit removal of cylinder container



1500-TON STRETCHER has heads mounted on box beams 130 ft long, each weighing 123 tons. Safety allowance is designed to absorb potential 17,000,000 in. lb of kinetic energy that could be released should an extrusion break while under tension

AF Heavy Press Program Gets Under Way

German-built extrusion press at Alcoa Lafayette, plus $4 million worth of auxiliary equipment, produces 110-ft spar caps for high-speed jet bombers

LAFAYETTE, IND—First part of the Air Force heavy press program to go into operation is the 14,000-ton aluminum extrusion press operated here by Aluminum Co of America. Built in Germany by Schloemann, the press was unfinished at the end of World War II. As one part of the heavy press program, this 13,200-ton extrusion press was redesigned (boosting power to 14,000 tons and making other changes including a new electrical system designed by Alcoa) and completed.

At present the largest extrusion presses in the US are 5500 tons and cross section is limited to a 13-in. circle. The new press boosts circle diameter to 23 in. Size that can be produced is boosted from 5.4 to 22.7 lb per ft (4.5 to 19 sq in. cross-sectional area). Total size can now be 110 ft long, weighing up to 2500 lb.

To supplement the press, Alcoa has provided auxiliary equipment costing $4 million. Included is a 1500-ton hydraulic stretcher that will handle 120 ft lengths of 75S with 60 sq in. cross section. It can handle shapes of 37-in. width (extrusions may be flattened to widths greater than the circumscribing circle of the press.

Manufacturing Limits for 14,000-ton Extrusion Press

Circumscribing Circle Dia, In.	Minimum Thickness, In. 615 and 625	14S	24S and 75S
Under 13	0.109	0.125	0.156
13 to 16	0.125	0.156	0.187
16 to 19	0.140	0.171	0.250
19 to 23	0.156	0.187	0.375

Ingots are heated in 60-cycle induction coils designed and built by Alcoa. Ingot handling is by clamp devices traveling on rails. Electrically operated, these "Stak-Rak" units clamp on the ingot, lift it, rotate. They resemble the handling mechanism of a fork truck.

Press tools are heated by three low-frequency induction coils, each able to handle tools of 50-in. dia by 28 in. thick. A gas-fired holding furnace with three compartments holds tools at temperature after induction heating until they are needed.

A 120-ft horziontal furnace with a conveyor hearth is provided for solution heat-treatment. It is a gas-fired, batch furnace followed by quenching in a spray chamber. Vertical electric furnaces with immersion quenching are also included. They are limited to extrusions 40 ft long.

Other equipment includes a 96-in. saw for cutting to length, a 120-ft oven for artificial aging, roll-contouring machines, and detwisters. Large turning and boring equipment for tools is to be installed.

From early production runs preliminary manufacturing limits have been established (see table). Principal initial application of the press will be the extrusion of aircraft spar caps. Until now design of large planes had to be compromised because one-piece spars could not be extruded. Stepped extrusions can be produced to reduce the machining required in sharply tapered spar caps.

To Extrude 34-In. Skins

Alcoa also expects to extrude integrally stiffened skins 34 in. wide, first producing a V-shape, then flattening. Wider skins can be produced if a satisfactory method of flattening skins extruded in a circular configuration can be developed.

Some extrusion capacity is expected to be available for other than aircraft applications, including shapes and pipe to 20-in. dia.

Pure Metals Direct from Raw Ores

It's possible now with a high-intensity-arc refining process —and it can be done at a third the cost of producing pure metal or metal salts by conventional refining processes

NEW YORK—A new process that produces pure metals or metal salts directly from refractory ores has been developed by two scientists, Dr Charles Sheer of Columbia University and Dr Samuel Korman, who worked on the theory under the atomic-energy program before the Korean War. Pilot-plant results with beryllium ore, beryl, indicate that this metal can be reduced from ore at about a third of present costs.

Two points about the process are unique:

• **Basic theory** is to heat the metal in a high-current-density arc to about 10,000 C. Chlorine autmosphere in the furnace joins the vaporizing metal, forming metallic chlorides that can be condensed—each metal chloride condensed separately, which simplifies reduction to pure metal.

• **Process can be applied to purify any metal,** with only minor changes in basic plant setup, which is relatively small and simple. System appears to be suitable for such materials as titanium, tungsten, vanadium, and molybdenum; which may result in much more widespread use of unusual metals in new applications.

Commercially, the process looks like it will have great impact. Plant fittings and equipment are standard industrial items, and total investment necessary is only about a third of that now required to produce the same quantity of pure metal. Main hinging point for a large plant is cheap electric power, which means it could be a natural for atomic-power application when that is available.

The process works simply: (1) raw beryl ore is mixed with about 30% cheap soft coal; then (2) rod-shaped electrodes are extruded and baked to make them conductive; (3) an arc is struck between two like electrodes in the furnace, and (4) electrodes are fed continuously as the material is consumed. Unlike carbon-arc theory, which tries to conserve the carbon, the furnace arc is designed to eat up material rapidly.

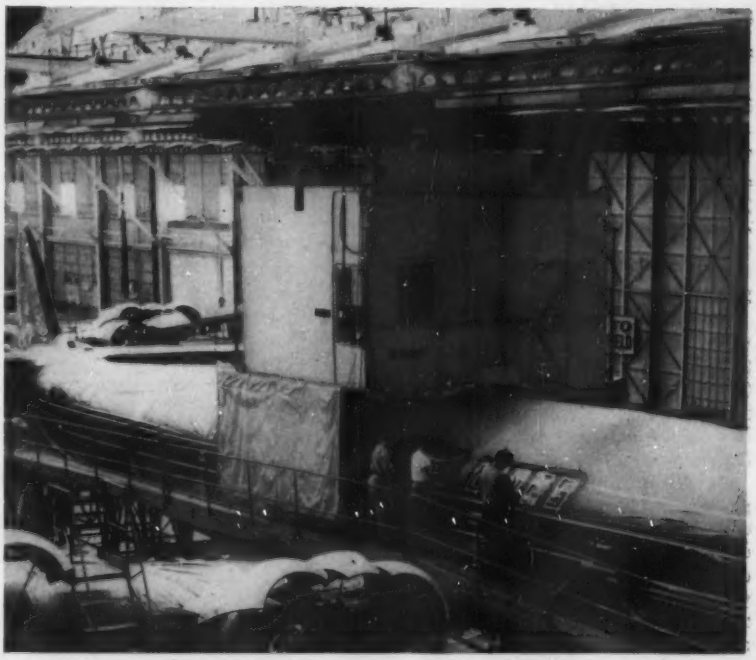
Electrodes are 2 to 4 in. in dia, determined by material characteristics and the current density required. For other ores, rods might be of different size. Arc heat vaporizes any material instantly, throwing off products faster than 100 mph.

Separate condensers for each material thrown off catch the chlorides, which can easily be reduced by electrolysis to pure metal. From beryl, the products are chlorides of beryllium, iron, silicon, and aluminum.

High-purity metals are produced, which indicates that the process may be applied in some cases to get pure metals where the material cannot ordinarily be obtained cheaper by conventional methods. In some cases, purity will mean easier machining and fabricating economies.

Plans for establishing a 10,000-lb-per-year prototype plant within six months to a year and a commercial 100,000-lb/yr plant in 18 mo are being completed by Light Metals Refining Corp, headed by Philip H Sellew and directed by the inventors. Beryllium is the only metal now being considered for production, but early tests on titanium have produced "optimistic" results.

Another function the arc can fill is in producing alloys of metals, made by adding alloying elements to the electrodes. The patented process may also be applied for making aluminum, magnesium, and lithium.



Spray-As-You-Go

LOCKHEED CALLS IT A "HOWDAH," because of its resemblance to the plush, booth-like elephant saddles used by Indian maharajahs. Whatever you call it, this traveling paint booth cuts five days off production time at Lockheed Burbank. Painters work inside the booth, which travels back and forth along the fuselage and can be moved from plane to plane. Before the air-conditioned howdah was invented, each plane had to be moved to another shop for painting

FREE MACHINING TOOL STEELS: Yes or No?

Is it a good idea to add sulfur to tool steel to get free machining properties? That question is receiving a lot of attention in industry right now. And some plants are even holding up buying certain steels until they know the answer

NEW YORK—It all started last year when Latrobe Steel Co began to field test a steel of the M2 type (molybdenum-tungsten-high-speed steel), containing about 0.1% sulfur. The idea was to find a tool steel more suitable for form-relieved hobs. Not only did Latrobe find the machinability properties it was looking for, but, to its surprise, it produced longer hob life, too.

Addition of the sulfur in the alloying process apparently forms alloy sulfides distributed with the carbides through the steel. At first it was thought that molybdenum disulfide was the constituent giving free-machining properties to the steel, but this has been ruled out by similar results from sulfur in tungsten high-speed steels, and Latrobe metallurgists say they have not yet been able to determine the exact consistency of these sulfides.

Sulfur has always been classed as an impurity in steels. It is added to screw stock to obtain free-machining qualities at the expense of physical properties, in other cases it is kept to a minimum. According to Latrobe, the sulfur does not form long stringers reducing physicals when added to high-speed steels and high-carbon, high-chromium steels.

Since it was first introduced, Latrobe has changed their entire line of high-speed tool steels, both tungsten and molybdenum, and their high-carbon, high-chromium die steels to the alloy sulfide compositions. They admit they are investigating the possibilities of this and other additives to other tool and die steels but have no plans as yet for further changes.

Among other tool-steel producers, opinion is sharply divided. Some companies are marketing steels with free-machining additives; others feel strongly that purity of the steel is more important to long service life than initial ease in machining.

Case histories are being assembled by both groups to prove their points. There is certainly evidence that in some cases longer tool life was obtained from the new steels. It seems evident that, for the present, most tool and die steel users want to make their own tests, in their own plants, to see whether they can obtain the same results.

Latrobe has applied for a patent on their high-speed steels, state that if they get it they will license all comers at a nominal fee. Simonds Saw & Steel has a patent on a high-sulfur content for high-carbon, high-chromium steel and Latrobe is operating under a license on this patent. Simonds obtained their patent 14 years ago but have apparently not made any commercial use of it.

Widespread interest in this development is undoubtedly stimulating the already active research at all companies producing tool and die steel. This is a result that both producers and users can applaud, for the trend towards heavier equipment and higher speeds is producing an increasing need for better grades of tool and die steel.

Bodine Heads Industry Medical Fund

Alfred V Bodine

NEW YORK—Alfred V Bodine, president and treasurer Bodine Corp, Bridgeport, Conn, has been named chairman of the Machine Tool Builders' Division of the Committee of American Industry—a branch of the National Fund for Medical Education devoted to raising $10 million to aid US medical schools.

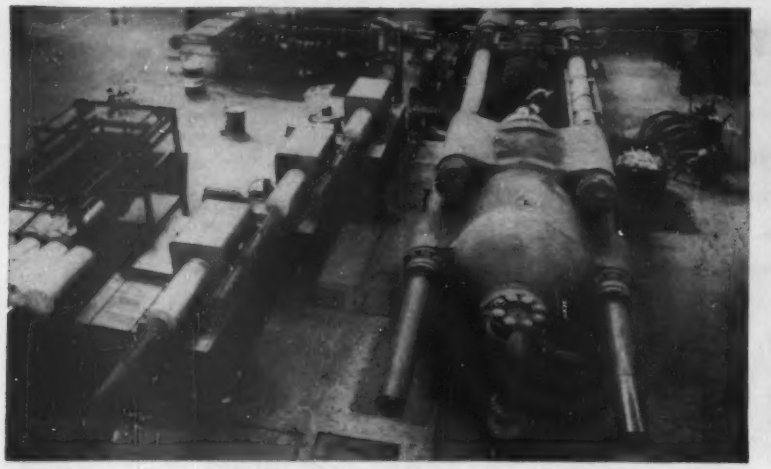
Mr Bodine as Division chairman heads a group of nationally prominent machine tool builders, including: Reed M Andress, president Barnes Drill Co; Hardage L Andrews, president Jones & Lamson Machine Co; H Glenn Bixby, president Ex-Cell-O Corp; John C Cotner, president Hydraulic Press Mfg Co; Ralph S Howe, president New Britain Machine Co; Louis Polk, president Sheffield Corp; John J Prindiville, Jr, president LaPointe Machine Tool Co; Henry D Sharpe, Jr, president Brown & Sharpe Mfg Co; Norman F Smith, president Osborn Mfg Co; Charles J Stilwell, president Warner & Swasey Co; and Herbert L Tigges, executive vice president Baker Bros Inc and president National Machine Tool Builders' Association.

GISHOLT TO LEASE MACHINE TOOLS

MADISON, WIS — Gisholt Machine Co of this city has announced three plans for renting machine tools, each based on a seven-year agreement. Right to terminate the agreement at the end of one, two or three years depends upon the plan selected. And lessee has the option to purchase at the end of the first, second or third year.

Gisholt's plans cover rental of standard machines and required electrical equipment. Specified accessories and tooling must be purchased outright. Special-purpose machines can be leased by special arrangement. Only firms with well established credit, located within the continental US may lease under the plan.

Gisholt will lease any machine tools in its entire line.



THREE-STAGE INDUCTION HEATING OF BILLETS for 5500-ton extrusion press. Pneumatic cylinders handle loading and transfer between stages. Press runout tables now have automatic tension devices

ONE-TON MAGNESIUM INGOT for new rolling mill replaces 100-lb ingot from which sheet was previously rolled

Dow Plunges on Integrated Mill for

Dow Chemical Co is betting $40 million on the future of magnesium. Its blue chips: coil, wider sheet with better finish, lower prices, higher output

MADISON, ILL — Magnesium sheet and extrusion capacity are substantially increased by the opening here of Dow's Madison Mill. At present about 3½-million lb of magnesium sheet is produced a year. The new integrated rolling mill has a nominal capacity of 16-million lb per year and some observers feel it could actually produce 60 million, if necessary. Dow has announced price reductions on sheet ranging from 4 to 28%.

At the same time, all of Dow's extrusion facilities have been concentrated at Madison. They include 1700-, 3000-, and 5500-ton presses moved from Midland, Mich, and new self-contained 1700- and 3000-ton presses. Increase in capacity from the new presses and changes in handling provide a 50% increase in capacity. A 13,200-ton press is now being installed. Built by Hydraulik in Germany, it is part of the Air Force heavy press program.

The alloy plant at Madison has three direct-chill continuous rolling and ingot casters and one remelt ingot casting unit with a total capacity of 36 million lb per year.

Plans for increased magnesium capacity have been under consideration since tests in 1946 indicated the feasibility of rolling on a modern mill. Search for a site began in 1949 and the rehabilitation of the Madison plant (1.5 million sq ft) began in March, 1951.

Rolling equipment includes an 84-in., 4-high reversing strip mill with 42-in. vertical edger, and 84-, 68-, 66-, 36-, and 18-in. non-reversing mills, all 4-high, single stand.

Roll With Plastic Lubricant

Other equipment includes leveling, edge trimming, and wire brushing equipment to produce finished sheets 72 in. wide. Sheet produced on the new mill is more uniform with better surface finish than has previously been available. Previous rolling has been dry, but flood lubrication with a plastic resin has now been adopted.

A pickle line for finished sheet has been installed to degrease, pickle, wash, and dry at 100 fpm.

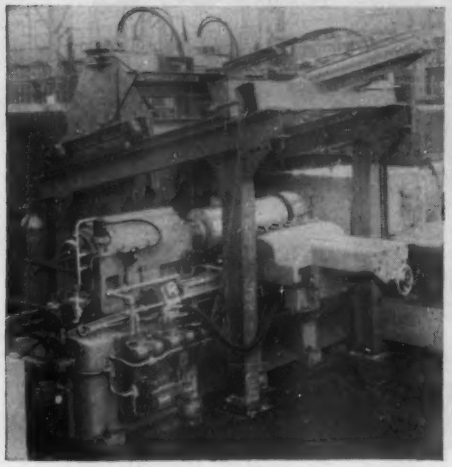
All extrusion presses are equipped with induction heaters. The 5500-ton press requires three-stage heating, the other presses have single stage. Runout tables have automatic tensioning devices to hold the extrusion under preset tension while it is being pushed through the die, reducing the amount of straightening required.

When the extrusion has been sawed to length, chain conveyors lift through slots cutting across the table and shift the extrusion to one side. The tensioning device then travels down the table to clamp the end of the next piece. Three stretch straighteners have been installed and aging capacity is double what it was in the former plant at Midland.

Total investment for equipment in the plant is about $40 million. It represents a calculated risk by Dow that the increased availability (sheet was not available in 72 in. widths, coil was not available at all) and improved finish will create sufficient demand to make the investment pay.

Among auxiliary equipment is a billet-scalping machine developed by Morey Machinery Co to turn billets for the extrusion presses. The automatic, hydraulically operated machine has a 200-hp motor and handles 10- to 19-in. dia, 25- to 40-in. lengths.

Delivered to the machine by conveyor, billet is picked up by the loading device and shifted into position in the machine where it is clamped by pressure (there are no centers) and driven by spur buttons that make an



EXTRUSION BILLETS ARE SCALPED automatically in special Morey lathe at rate of 30 per hour

Magnesium

impression about 1/32 in. into the end.

Carbide-tipped turning tools (up to 18 can be mounted) are mounted directly on the carriage by T-bolts. This carriage is hydraulically actuated through the automatic cycle. The scalped billet is picked up by the loading device and transferred to a second conveyor. Capacity of the machine is 30 per hour.

MONTREAL TOOL SHOW SLATED FOR NOVEMBER

MONTREAL, QUE—The Foreman's Club of Montreal will again sponsor the Montreal Tool & Equipment Show here, November 8-12.

Claimed to be "the only trade show in Canada organized exclusively to bring plant production men and producers of production equipment together," the Montreal Tool & Equipment Show will feature exhibits of machine tools and metalworking equipment from Canada, the United States, and from several foreign countries.

Admission is by registration only. Forms may be obtained from Show headquarters at 4585 Sherbrooke St West, Montreal, or from the Show's offices at 19 Melinda St, Toronto.

TOOL SHOW: Dixieland Style

South's first big machine tool show draws plenty of interest in an area where new industries are springing up almost daily

ATLANTA—Billed as the first major machine tool show ever held in the South, R O Deaderick Co Inc of Knoxville and Atlanta displayed some 40 machine tools, valued at upwards of $1 million, at the Atlanta Biltmore Exhibition Hall May 19-21. The show's operating exhibits of the products of more than a dozen well-known machine tool firms drew more than a thousand potential buyers from Southeastern industries, plus interested Atlantans and engineering students.

Primary reason for the show, according to its sponsor, Richard O Deaderick, who hopes to make it a frequent occurence, is the startling growth of industry in the Southeast, where it is estimated one new firm has opened its doors every working day for the last ten years. Heretofore, says Mr Deaderick, Southern industry has gone north for its capital equipment, and now it's high time the tool companies came south to their potential customers.

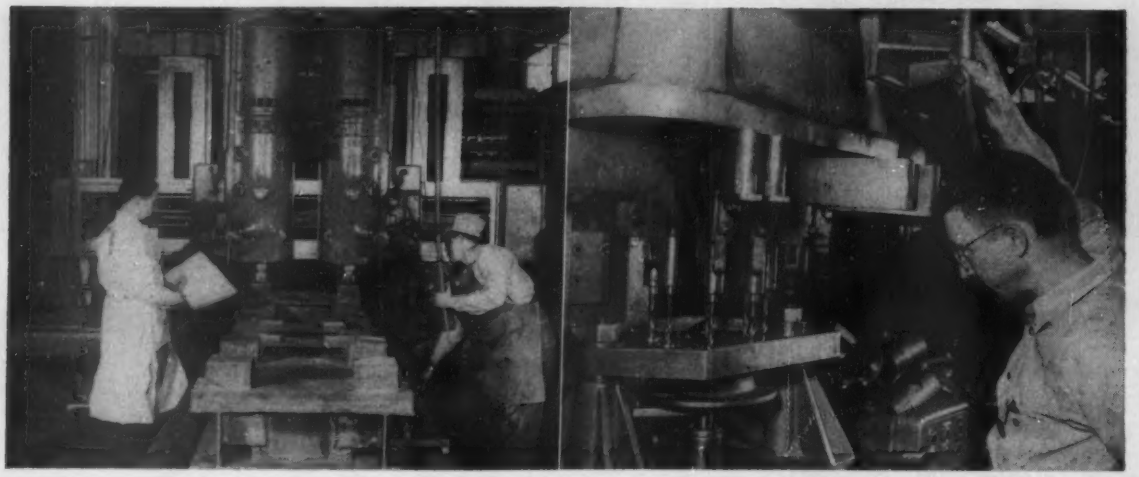
And many prominent US machine tool builders agree with Mr Deaderick, as was evidenced by their exhibits at the Atlanta show, including:

American Tool Works, Cincinnati; Avey Drilling Machine Co, Cincinnati; Bridgeport Machines, Inc, Bridgeport, Conn; Cone Automatic Machine Co, Windsor, Vt; Gisholt Machine Co, Madison, Wis; DeVlieg Machine Co, Detroit; Grob Brothers Inc, Grafton, Wis; Nobel Machine Tool Co, Cincinnati; Niagara Machine & Tool Works, Buffalo; Sheldon Machine Co, Inc, Chicago; Turchan Follower Machine Co, Detroit; D C Morrison Co, Cincinnati; and Van Norman Co, Springfield, Mass.

Although the South averages only 21.4 machine tools per 100 employees as compared to the national average of 33.3, Southern industry has expanded rapidly in recent years. Between 1940 and 1953, gross sales of Southeastern metalworking plants increased by 283%. And chances are, according to Mr Deaderick, that the Southern ratio of tools-per-100 workers will at least equal the national average within the next five years—good reason for increased interest on the part of machine tool builders in the Southern market. And Mr. Deaderick cited a recent study that shows area capital expansion in the next five years will exceed $200 million.

GEORGIA TECH INSTRUCTORS get some fine points on Spiramatic jigmill operation from its builder, Charles DeVlieg of DeVlieg Machine Co, Detroit. In foreground, left to right: Mr DeVlieg, R A Allen, Hayden Zimmerman and W A Hinton, all of Tech

VERTICAL MILL AND TABLE operation is demonstrated by Advance Products Co salesmen Henry Kraklan (far left) and Otto Kelm (center left) to L E Powell and R G Grim of Loftis Sprinkler Equipment Co at the Atlanta machine tool show



Milling and Drilling at Fairbanks-Morse's New Pump Plant

A-1 EQUIPMENT + A-Z QUALITY CONTROL is the watchword at Fairbanks, Morse & Co's new pump manufacturing plant and foundry at Kansas City, Kan. Left: milling a diesel engine, motor and pump base on milling machine that cuts four sides. Right: drilling eight holes simultaneously on a pump adapter. Emphasis is on top quality control in every manufacturing operation throughout the 180,000-sq-ft plant and mechanized foundry

"New Look" Hits Caterpillar Plant

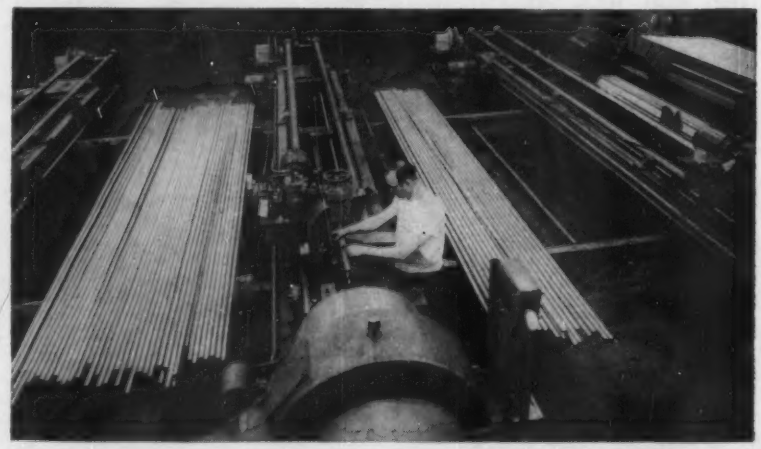
Not automation, but between-machines conveyors—shaker, flight, belt and roller—minimize work handling. In combination with special high-production machines, they reduce labor requirements by two-thirds, and are expected to pay out quickly

YORK, Pa—When Caterpillar's crawler-track plant gets into full production, impressive labor savings are expected from the combination of the latest high-production machinery and between-machines conveyors. Most of those that move workpieces horizontally are of the shaker type, oscillated by an eccentric.

On one production line—the track link—only five people will eventually be needed, as compared to 16 in an older facility at Peoria. In all, eight production lines for the various components will be required.

As set up, the track-link line will turn out 50% more production and at two-thirds less labor, and is expected to pay for the "automation" in a couple of years, or less. The line is remarkable for the number of shaker conveyors employed to move and store work in process. Some of these conveyors are nearly 75 ft. long.

At assembly, track links and pins are automatically assembled and fed out like a piece of braid. The pins are squeezed after insertion in the links, thus heading the ends.



ROLLER BURNISHING of ground steel bars for track-link pins produces a more wear-resistant and smoother surface. Caterpillar's York crawler-track production line is set up to avoid slow, dangerous manual handling

Supply Groups Hold Joint Meeting

"How can we help you sell our product?" was the thinking behind the Industry Supply Convention, when manufacturers held open house in 313 booths to talk over mutual problems with their distributors

NEW YORK — Sports events gave way to industry talk at Madison Square Garden May 18, when manufacturers and their distributors got together at 313 manufacturers' booths to discuss mutual sales problems. The one-day booth show at the Garden was a feature of a three-day joint Industry Supply Convention, held at the Waldorf Astoria by the American Supply & Machinery Manufacturers' Association, the National Industrial Distributors' Association, and the Southern Industrial Distributors' Association May 17-19.

Three prominent speakers discussed the psychology of success, and the national and world economic outlook during the three days: Dr Norman Vincent Peale of Marble Collegiate Church, New York, on "Success Through Right Thinking"; Dr Kenneth McFarland, educational consultant to General Motors Corp and American Trucking Associations Inc, on "Thinkin' Tall"; and Gen Carlos P Romulo, first Philippine ambassador to the US, and president of the Fourth General Assembly of the United Nations, on "Today's World — Tomorrow's goals."

Opening day's session, Monday, May 17, was held jointly by the three associations. Second day's program was a joint meeting of SIDA and NIDA, with ASMMA members invited to attend if they wished. Third day's program consisted of another joint SIDA-NIDA session in the morning; a simultaneous ASMMA annual membership meeting, and SIDA's and NIDA's annual meetings later in the morning. All three associations attended the final luncheon meeting to hear General Romulo speak.

ASMMA Elects

New ASMMA officers are: president, T D Vander Voort, Clemson Bros, Middletown, NY; 1st vice president, C B Noelting, Faultless Caster Corp, Evansville, Ind; 2nd vice president, C T Jordan, Charles Parker Co, Meriden, Conn; secretary, S H Cross, Stanley Electric Tools, New Britain, Conn; and treasurer, Dan C Swander, Jr, Columbian Vise & Manufacturing Co, Cleveland.

Albert R Stedfast

Albert M Stedfast

Albert M Stedfast, Jr

It's 100 Years for Stedfast & Roulston

BOSTON—Four company names and three changes of address since the firm's founding in 1854, Stedfast & Roulston, Inc., Boston's "Machinery Merchants," is today celebrating its first century as distributors of machine tools and metalworking equipment in the New England area. Started in 1854 at 80 Milk St, Boston, as Brown-McMurtrie Co, dealers in metalworking machinery, woodworking and sawmill equipment, the firm changed its name to Hill, Clarke & Co three years later, and in 1870 expanded into new quarters at 36 Oliver St. Expanding business again necessitated a move to bigger quarters in 1887, just down the street at 156 Oliver St. In 1927, Stedfast & Roulston was organized to succeed Hill, Clarke & Co, when the firm's head, C A Clarke, retired. Albert R Stedfast was president of the newly named company, with James W Roulston as vice president; Albert M Stedfast as secretary, and Ethel A Nye as treasurer. In 1946, Albert M Stedfast succeeded his father, Albert R Stedfast, as president. And the third generation of Stedfasts, Albert M, Jr, is now with the company as a sales representative. Still another Stedfast, Stanley W, has been secretary of the company since 1931. Since 1951, Stedfast & Roulston Inc has been in its present offices at 11 Deerfield St, Boston, where it serves as exclusive New England representative for more than a dozen firms.

Paul W Polk

John Delaney

J W McMullen

Names in the News . . .

Paul W Polk has been elected president of Threadwell Tap & Die Co, Greenfield, Mass. He had previously been vice president and general manager. Other officers are: **Louis F Polk,** chairman and treasurer; **John P Bernard,** vice president; **R F Whisler,** vice president and assistant treasurer; **Edward T Noe, Jr,** secretary; and **Glenn E Price,** assistant secretary. Threadwell is a subsidiary of Sheffield Corp, Dayton, Ohio.

Wayne Ewing, president of Arrowsmith Tool & Die Corp, Los Angeles, has been elected secretary of the American Society of Tool Engineers. He has previously served as assistant secretary-treasurer.

James Bere has been appointed assistant general manager of Clearing Machine Corp's Hamilton, Ohio, plant. Mr Bere, who joined the firm in 1946, has been managing the southern Ohio sales territory, and prior to that had been a member of the Chicago sales staff.

John Delaney has been named vice president and factory manager of Lincoln Park Industries, Inc, Lincoln Park, Mich. Formerly development engineer, Mr Delaney has been a member of the firm since 1952. Plant Manager **Robert G Field** has been named sales manager and administrative assistant.

Robert G Allen has been named president and general manager of Borg-Warner Corp's Pesco Products Div, Bedford, Ohio. **Robert J Minshall,** former president, has been made chairman of the supervisory board and director of research and development for the division.

W W Frymoyer has been elected a vice president of The Foxboro Co, Foxboro, Mass. A member of the firm since 1926, Mr Frymoyer has served as director of research, and general superintendent. Since 1951 he has been factory manager and will continue in this capacity, supervising all instrument manufacturing activities of the company.

J W McMullen, general manager of Pittsburgh Works of Allis-Chalmers Mfg Co, has been named vice president in charge of the newly-formed transformer and switchgear department in the firm's general machinery division. He will be responsible for all transformer and switchgear operations at the Hawley, Terre Haute, and West Allis plants, where he will make his headquarters. Mr McMullen joined the Pittsburgh Transformer Co in 1917, ten years before it was acquired by Allis Chalmers. He was appointed assistant manager of the transformer section in 1945, and general manager two years later. **David A Griffith,** assistant general manager of the Pittsburgh Works, succeeds Mr McMullen.

Charles R Crowder, executive vice president of Van Norman Co, Springfield, Mass, has been elected president of the Springfield Chamber of Commerce. Associated with the company since 1929, Mr Crowder was made sales promotion manager in 1937; vice president, Automotive Div, 1945; vice president and general manager in 1950; and executive vice president in 1952.

James Bere

W W Frymoyer

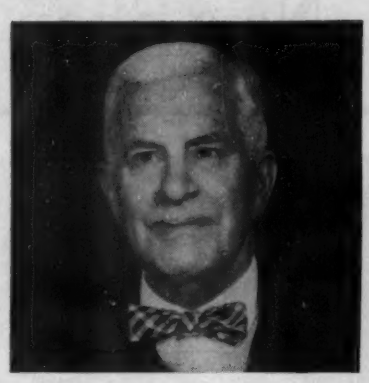
Charles R Crowder

Henry D. Sharpe Dies—Headed B&S 52 Years

Henry D Sharpe, chairman of the board of the Brown & Sharpe Mfg Co, Providence, RI, died on May 17 at the age of 81. Up to 1951, he had been president and directing head of the company for 52 years, having assumed that responsibility at the age of 27 upon his father's death. In addition, he had been a leader through the years in industry, education, finance, and social welfare.

Mr Sharpe was a graduate of Brown University who devoted endless hours and gave generous financial support to his alma mater. He was made a trustee of Brown in 1904, and in 1932 became chancellor of the university, serving in that capacity until his death. Upon the fiftieth anniversary of his graduation, he was awarded Brown's most distinguished honor, the Susan Colver Rosenberger Medal, conferred only five times previously.

He helped to organize the New England Council and twice was its president. He was a trustee of the Rhode Island School of Design with which he had been actively associated for almost 40 years. He helped organize and was the first president of the Providence Community Fund, Inc. He expressed his interest in governmental operations partly by aiding the founding of the Providence Governmental Research Bureau and by becoming the first president of the Rhode Island Public Expenditure Council.



Mr Sharpe was long a director of the United States Chamber of Commerce, and at one time was chairman of the Chamber's foreign commerce committee and a delegate to the Pan-American Commercial Conference. He was active in the National Association of Manufacturers and in 1939 was a member of its economic policy committee. Since early in the century he had been a director of The Providence Journal Co and was first vice president from 1942-1952.

In 1946 Mr Sharpe was made a member of the Council of the United States Associates, successor in broadened form of the American section of the International Chamber of Commerce. He was a director of many business and financial institutions.

Mr Sharpe's father, Lucian Sharpe, was a founder of Brown & Sharpe, along with Joseph R Brown, in 1853, the firm at first being known as J R Brown & Sharpe. Lucian Sharpe started as an apprentice with Mr Brown in the latter's shop in Providence, his apprenticeship being of the old type of indenture. Brown & Sharpe later became famed for its apprentice program, which was vigorously supported by Henry D Sharpe during his more than half a century of the company's direction.

Of Henry D Sharpe it has rightly been said that "he has given half of his life to material production and the other half to institutions of philanthropy and education."

Norman K Anderson has been named general sales manager of Warner Electric Brake & Clutch Co, Beloit, Wis. Mr Anderson, who had been manager of the firm's industrial division, joined Warner in 1946. He will be responsible for both automotive and industrial sales.

Edward A Farwig has been named chief engineer, Buhr Machine Tool Co, Ann Arbor, Mich. **Otto Haisch** has been appointed assistant to the sales manager.

Edward A Farwig

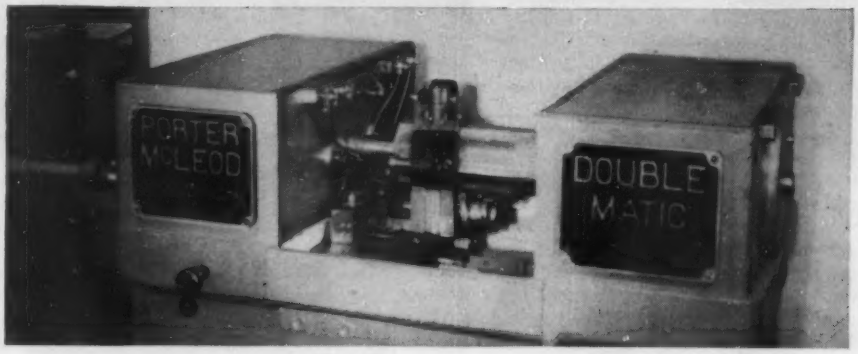
Donald C Burnham has joined the Westinghouse Electric Corp as vice president in charge of manufacturing; he succeeds **T I Phillips** who is retiring after 39 years of service. Mr Burnham has been associated for many years with General Motors Corp, most recently as manufacturing manager, and assistant chief engineer of the Oldsmobile division. He joined GM's AC Spark Plug Div in 1936; in 1938 he was transferred to the Ternstedt Div, assigned to manufacturing methods and plant layout. He has been connected with Oldsmobile since 1941.

Charles S Tennant, formerly production manager of Ford Motor Co's Cleveland Engine Plant No. 1 in Brookpark Village, has been appointed plant manager of Plant No. 2 now under construction in the same area. The new facility is scheduled to begin production of Ford 8-cylinder passenger car and truck engines late this year. Mr Tennant has been a member of the organization since 1931; he has been production manager of the Cleveland plant for the past four years.

Herbert Harig, vice president of Harig Mfg Corp, Chicago, has been elected secretary of the National Tool & Die Manufacturers Association.

Emil Gairing, founder and former president of the Gairing Tool Co, Detroit, has joined the Waukesha Tool Co, Waukesha, Wis, as executive vice president and a director. In his new capacity he is responsible for sales, engineering, and production.

Emil Gairing



FOUR-STATION HEADSTOCK is the principal design advantage of this automatic screw-machine. Second operations are eliminated. Compact, rugged construction provides rigidity. Extremely accurate drilling, reaming, and tapping are claimed, even with heavy cuts. Both ends of workpiece are completed during each cycle

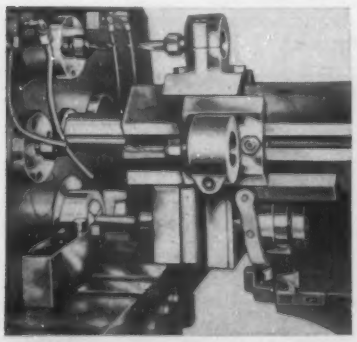
Porter-McLeod Double-Matic Screw-Machine Eliminates Second-Operation Handling

Operation time, power, and floor space are saved through the use of this newly designed screw machine. Automatic in operation, the Double-Matic machines both the front and the back end of a workpiece in a single cycle. It will also handle work which requires only a first operation.

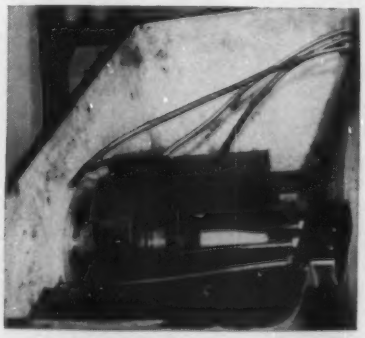
The basic design principle provides two sets of turret stations. Four stations are available on the conventional turret and another four stations are fixed to the headstock. A front and a back tool-slide are also provided. Upon completion of the front-end work, as the parting tool moves in, a powered pickoff spindle mounted on the turret grasps the workpiece. Then, while the turret tools machine the front end of the next workpiece, the back end of the piece, held in the pick-off spindle, is worked by the tools mounted on the headstock. When the cycle is complete, and prior to grasping the next piece, the workpiece is ejected from the pick-off spindle by a positive pushrod.

Revolving on an axis parallel to the spindle, on a rigid tool slide supported between the headstock and the cam and drive housing, the four-position turret carries most of the front-end-working tools plus the pick-off spindle. Forming and cut-off tools are mounted on the independently cam-actuated front and rear cross-slides.

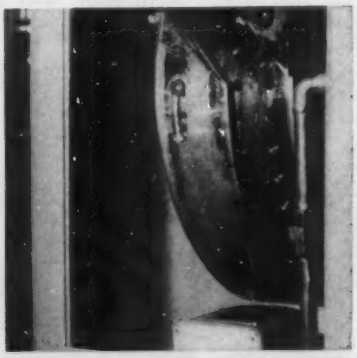
Normally, says the manufacturer, parts that require 15 sec to machine on an automatic take at least 60 sec more for secondary operations. This figure does not include the time spent in rehandling. With the Double-Matic, rehandling is usually eliminated and, for many parts, the second operations are completed in the original machining cycle.



PICK-OFF SPINDLE ON TURRET (bottom position), driven through spline shaft from main-drive spindle, grasps part during cut-off and completes machining cycle using headstock-mounted tools



INDEXING MECHANISM does not depend upon a locking pin for positioning. Instead, a hardened and ground steel index plate slides on hardened and ground steel ways to locate and pilot each turret position



SIMPLE CAMS, readily formed from flat steel plates, are used to actuate the turret. Cams and drive mechanisms are readily accessible for setup or maintenance

Materials and Parts . . .

For example, this machine can form, point, and cutoff a ½-in.-dia chrome-molybdenum center-drill blank in less than 15 sec.

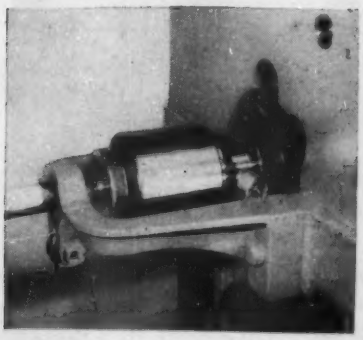
Heavy, smooth cuts are possible because the machine design provides inherent rigidity plus close proximity of tools, and holders, to work. Cams are used to actuate all tool and chuck motions. The main spindle is mounted in two double-row precision ball bearings. Cycle time is from 4½ sec up, in nine stages, relative to spindle speed. Adjustable friction drives are provided between the camming mechanism and the drive-spindle, rather than keying, so that everything will stop, rather than break, if anything jams.

Specifications

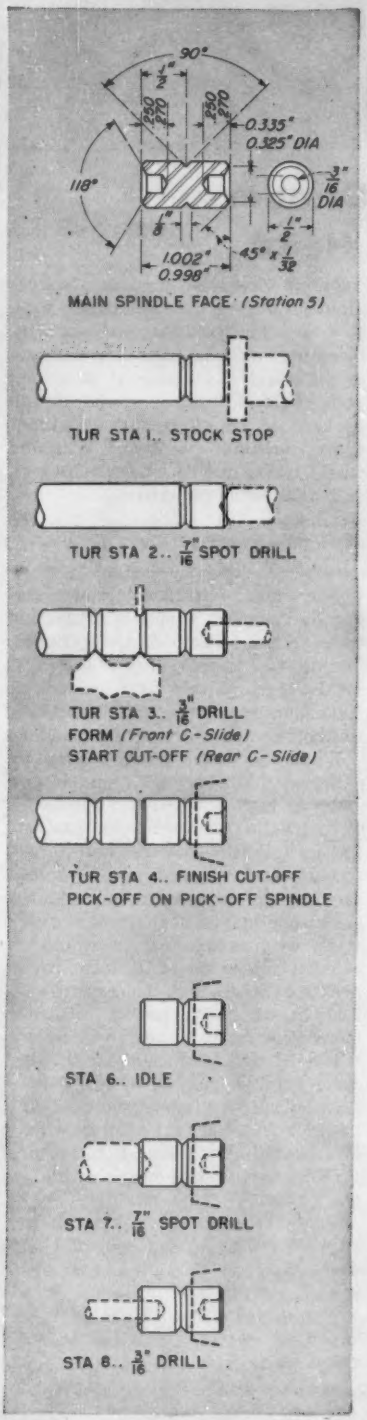
Bar capacity	Up to, and including, 1.0 in.
Workpiece length	Up to, and including 4½ in.
Spindle speeds	400 to 3000 rpm, higher on special order
Motor	3 hp, 3 phase, 1800 rpm
Coolant capacity	20 gallons
Floor space (without feed tube)	57 x 27 in.

Porter McLeod Machine Tool Co, Inc, Hatfield, Mass.

TOOL ARRANGEMENT and turret cycle are shown to indicate operating principles. Spacious headstock permits use of many auxiliary tools, including powered heads for slotting or differential speed techniques. Coolant is supplied from central pump to all tool stations. Special work-positioner produces work-lengths accurate within 0.002 to 0.003 in.



COLLET OPERATING MECHANISM is also of new design. It opens instantly for feed-out—the bar cannot drag—and, when closed, jaws provide rigid grip on bar, regardless of spindle speed



. . . including

Production surface grinder, with cross-traveling head and hydraulic feed, has speed of 6000 sfpm . . . . . page 184

Large belt grinder, built for aircraft industry, has reciprocating table 84 in. wide by 16 ft long . . . . . page 185

Milling unit is attached to drill-press to allow sharpening of end mills . . . . . page 188

Line of broaches designed for finishing external surfaces on circular metal parts . . page 192

Powder-metal molding press has completely automatic control over pressing cycle page 196

Drape vacuum-forming machines are automatic, use actual product as test mold page 214

Magnetic adjustable V-block is calibrated to read to five minutes . . . . . page 216

Wet tool grinder has two-speed multiple V-belt drive from 5-hp motor to grinding spindle page 220

. . . and in June 21

Heavy-duty centerless grinder holds close tolerances on high production basis.

Vertical mill incorporates head which is vertically adjusted by counter-balanced ram.

Production Surface Grinder Has Cross-Traveling Head

Gallmeyer & Livingston cross-traveling-head, hydraulic-feed surface grinder is 24 x 25 x 96 in. Spindle is powered by 30-hp motor which provides 6000 sfpm with 20-in. head. Hydraulic drive motor is 15 hp.

The base is a one-piece casting—also the upright column which carries the vertically traveling head. Table speed varies from almost zero to 150 fpm, actuated through Vickers tandem pump.

Other features include: conveniently located control panel with oil-proof pushbuttons; one-shot lubricating system; hydraulic oil reservoir located outside of machine; and self-contained motor-driven coolant system. Accessory combinations include: built-in diamond wheel-truing device, magnetic chucks, and automatic downfeed.

Gallmeyer & Livingston Co, 346 Straight Ave, Grand Rapids, Mich

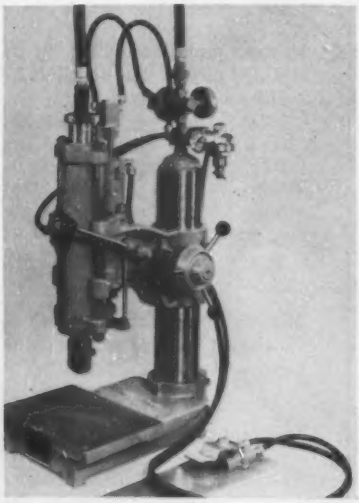
Portable Shear

Manco has developed a hydraulic cutter, the H-90 Guillotine shear for cold-drawing operations and adaptable to forging bar cutoff requirements. The 90-ton shear weighs 950 lb.

Square cut is obtained on all types of steel bar to 1½ in. round. Operation is electric-hydraulic, with cutoff time of 2 sec. Complete cycle is performed by touch of hand or foot switch. Automatic cycling is possible, actuated by loading operation.

Machine is mounted on wheels and has overall height of 48 in. Interchangeable dies in 1/16-in. increments are available.

Manco Mfg Co, Bradley, Ill



All-Pneumatic Impact Press Yields Uniform Impact Force

All-pneumatic impact press of Heidrich-Nourse was developed originally for impression marking of metal products. Principal features are stated to be: complete uniformity of impact force on work varying considerably in thickness; operator's safety; speed up to 10,000 cycles per hour.

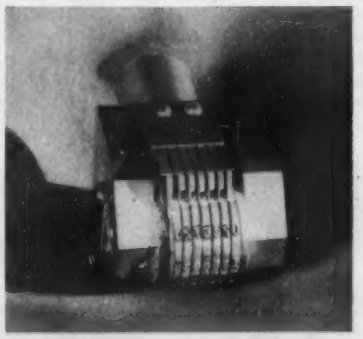
An air-hammer with variable stroke moves within a closed cylinder and strikes a chuck projecting through the bottom of the cylinder. Length of hammer stroke or travel inside the cylinder is adjusted by large handnut at top which changes the position of inner cylinder head.

When foot-valve pedal is pressed, cylinder assembly with chuck and tool is brought into contact with work by hydraulic traverse mechanism, and impact follows. Traverse and impact stroke are in linked sequence, but each can be adjusted independently. Clearance height of tool above work is set by moving head assembly on column. On work of uniform thickness clearance may be as little as 0.005 in. which will prevent operator from injuring his hands and machine still will deliver an impact of any desired force from 30 to 30,000 lb.

On work that varies considerably in thickness, vertical clearance may be set for the thickest piece and within the traverse range of 2¼ in. the impact will be uniform.

Press is reported to be simple, rugged, easily maintained, and economical to run. There is no flow of air except during operating cycle; air consumption is low. Machine is entirely air operated and has no electrical parts.

Heidrich-Nourse Co, 631 E Third St, Los Angeles 13, Calif



MARKING DEVICE for marking numerals in nameplates, forgings, and metal products can be used for serial numbering from zero to 999,999, or for repeating number or succession of numbers. Can be used by hand or in machines. Marking wheels are of selected tool steel, alloyed for abrasion resistance, and heat treated. Replacement wheels are in stock — *Acme Marking Equipment Co, 8030 Lyndon, Detroit 38, Mich*

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MACHINES AND ATTACHMENTS

1 PROFILE GRINDER — *Hommelwerke, GmbH Mannheim, Kaefertal 30, Germany.* 16-page catalog covers hydraulically controlled optical grinder for tool and die work. Forms are ground using part of drawing as reference, with drawing, work, and grinding wheel visible in optics.

2 POWER UNITS — *Ex-Cell-O Corp, Detroit 11.* 4-page folder shows quill-type hydraulic power units in two styles for 8- or 12-in. strokes, 3-hp capacity, for fixture operation.

3 HONING—*Sunnen Products Co, 7910 Manchester, St Louis 17.* 12-page bulletin presents users' results with hones on parts like gears, sleeves, dies, cutters, and cylinders.

4 GEAR GRINDERS—*Gear Grinding Machine Co, 3901 Christopher, Detroit 11.* 8-page folder on automatic gear grinding shows five applications, features of machine. 6-pager covers universal oscillating grinder with power oscillator for table, powered wheel carriage, and built-in dresser.

5 PRESS ACCESSORIES — *Durant Tool Supply Co, Providence 8, RI.* 16-page bulletin covers roll feeds, reels, cradles, oilers, straighteners, and foot presses, including specifications and prices.

6 MACHINE TOOLS — *South Bend Lathe Wks, 425 E Madison, South Bend 22, Ind.* 56-page catalog has 100 detailed illustrations of complete line of lathes, turret lathes, drillpresses, grinders, and shapers. Lathe swings range from 9 through 24 in.

7 DRILLS—*Cleerman Machine Tool Co, 640 W Washington Blvd, Chicago 11.* 12-page catalog shows round-column and box-column drilling machines, gang drills, layout drills, and jig boring machine, giving specifications, features, and illustrating salient points.

8 DRILL UNITS — *Hypneumat, Inc, 657 W Virginia St, Milwaukee 4.* 32-page unbound bulletin covers hydraulic and air, electrically controlled, drilling and tapping units that operate on pressure as low as 2 psi with up to 25-in. strokes.

9 INCLINABLE PRESSES — *Niagara Machine & Tool Wks, 637 Northland Buffalo 11.* 18-page bulletin features Series AA open-back inclinable punch presses with electro-pneumatic clutch. Extensive coverage on units from 4½ through 7½-ton size is included in detailed text and illustrations, including operating instructions and specifications.

10 SURFACE GRINDER — *Pratt & Whitney Div, Niles-Bement-Pond Co, W Hartford 1, Conn.* 8-page bulletin presents Model D 14-in. hydraulic vertical surface grinder with specifications, illustrations of work setups, and features.

11 GEAR LAPPERS — *Michigan Tool Co, 7171 E McNichols Rd, Detroit 12.* 8-page bulletin covers gear-lapping problems, showing two external, two internal gear-lapping machines with capacities and descriptions.

12 DRILL GRINDER—*Black Diamond Saw & Machine Wks, North Ave, Natick, Mass.* 4-page folder shows precision drill grinder, details four steps in accurate drill grinding, featuring quick work mounting.

13 WHEEL DRESSER — *Pratt & Whitney Div, Niles-Bement-Pond Co, W Hartford, Conn.* 4-page folder covers Diaform models 2A, 2B for wheels up to 2 in. wide, and forms to 1 in. deep. Shows technique of dressing.

TOOLS AND ACCESSORIES

14 FLUID CONTROL—*Simplex Valve & Meter Co, 68th St, Philadelphia 42.* 36-page bulletin lists all measurement and control equipment for gases and liquids, illustrating valves, gages, meters, and venturi tubes. Applications are in power, processing, water, and sewage industries.

15 FLOW METERS — *Minneapolis Honeywell Regulator Co, Wayne Ave, Philadelphia 44.* 56-page catalog 2320 presents uses, applications, theory, specifications, and connections for flow meters for indicating, recording, integrating, and controlling.

16 TOOL ANGLES—*Heller Engineering & Mfg Co, Lynwood, Calif.* Wall chart for engineers, Trig-Pal by name, covers trig functions including plane func-

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tions, compound angles, spherical trig, and areas of spherical shapes.

17 LUBRICANTS—*Fish Brothers Refining Co, 159 Lockwood St, Newark 5, NJ.* 36-page bulletin covers Lubriplate lubricants for all industrial applications. Includes general text on lubricants, lists of applications in various industries, and lists of dealers.

18 PORTABLE TOOLS—*Precise Products Corp, 1555 Clark St, Racine, Wis.* 12-page catalog presents complete line of portable electric grinder-millers, power quills, and machine-tool mounts and accessories. Listings include illustrations, specs, general description, and model numbers with sizes.

19 C'BORES — *Continental Tool Wks Div, Ex-Cell-O Corp, 1200 Oakman Blvd, Detroit 32.* 8-page booklet covers hand-detachable counterbores and pilots, and counterbores in sets. Lists complete line with sizes, material, mechanisms.

20 OPTICAL-GAGE FIXTURE — *Optical Gaging Products, Inc, 36 Forbes St, Rochester 11, NY.* 4-page bulletin with color cover shows how universal shaft-checking fixture works on a given example. Photos and sketches show principles.

21 HOBS — *Brad Foote Gear Wks, Cicero 50, Ill.* List shows over 2000 cutters, broaches, and special tools for working gears, splines, racks, and the like. Engineers can lay out special tools with these as references to save money on special costs.

22 THREAD GAGES—*Sheffield Corp, Dayton 1, Ohio.* 58-page booklet discusses use of direct-reading ramp gages for inspecting tapered threads, primarily in valves as used for compressed-gas cylinders. Booklet is a detailed study of the equipment and technique involved, covering taper, pitch dia, crest truncation, root, and bore size.

23 ABRASIVE TOOLS — *Metal Removal Co, 1546 N Orleans St, Chicago 10.* Wall chart showing carbide and abrasive tool shapes, and shapes of carbide burs, is for shop use, reference in ordering.

24 CUTTERS — *The Equipment Co, 555 Beaufait St, Detroit 7.* Anniversary catalog shows die-sinkers' cutters, end mills, Keller cutters, shell-end mills, toolbits, cutoff blades, c'bores, centerdrills, and slitting saws.

25 EQUIVALENTS — *Dayton Rogers Mfg Co, Minneapolis 7, Minn.* Combination decimal-equivalent chart and calendar is available on request on company letterhead.

HEAT-TREATING AND WELDING

26 WELDING — *Ampco Metal, Inc, 1745 S 38th St, Milwaukee 46, Wis.* Wall-chart (20 x 29½ in.) includes RWMA specifications for spotwelding similar and dissimilar metals. Other charts have data on properties of Ampco. Weld, high conductivity alloys, projection welding, and other information. Photos of Ampco holders, tips, shafts, wheels.

27 FLAME CUTTING—*Air Reduction Sales Co, 60 E 42nd St, New York 17, NY.* Booklet called, "Advanced Automatic Flame Cutting for Machinery Weldments" relates how a power shovel manufacturer converted from castings and riveted structures to weldments. Problems of changeover discussed, along with description of how electronic tracer helped increase production.

28 WELDING PROPERTIES — *Taylor Forge and Pipe Works, PO Box 485, Chicago 90, Ill.* ASME paper No. 53-A-70, "In-Plane Bending Properties of Welding Elbows" presents results of strain gage studies on relatively heavy WeldELLS having a ratio of bend radius to normal pipe size of 1½:1. Results compared to theory. Bulletin 884.

PLANT SERVICE EQUIPMENT

29 ELECTRIC HEATING UNITS — *Westinghouse Electric Corp, PO Box 2099, Pittsburgh 30, Pa.* Data on heaters, thermostats, and snap switches for industrial heating units. Wattage requirements, voltages, dimensions, and detail drawings. Section of booklet helps select proper heater for various applications. Booklet B-6161.

30 CLEANING EQUIPMENT — *N Ransohoff, Inc, Hamilton, Ohio.* Catalog describes history of company, and short description of how company operates for customers. Examples then given of various types of equipment company produces, including washing machinery, tumbling barrels, picklers, strip washers, chip separators, and other products.

31 ELECTRIC TRANSMISSION TRUCKS — *Automatic Transportation Co, 140 W 87th St, Chicago 20, Ill.* Brochure describes "Dynamotive" gas fork lift truck which has electric transmission. Specifications given for 4-, 5-, and 6000 lb capacity models.

PARTS AND MATERIALS

32 MECHANICAL CONTROLS, LINKAGES & MECHANISMS — *Teleflex Inc, Dept Y, 185 S Main St, North Wales, Pa.* 16-page Bulletin 500 illustrates and describes system with ability to transfer accurately linear or rotary motion over a devious path without intermediate links or pulleys. Applications, schematic drawings, layout procedures included.

33 CYLINDERS—*Miller Fluid Power Co, 2040 N Hawthorne Ave, Melrose Park, Ill.* Compact price list covers stock line of 540 individual cylinders in interchangeable mountings, including air units from 2 through 8-in. bores, hydraulic from 1½ through 4-in. bores, and cushioned and non-cushioned types. Strokes range from 2 through 12 in.

34 TOGGLE SWITCHES—*Micro Switch Div, Minneapolis-Honeywell Regulator Co, Freeport, Ill.* 12-page catalog 73A covers 19 precision snap-action toggle assemblies and over 90 AN and JAN approved designs, including assemblies to control from 1 to 24 separate electrical circuits. Includes dimensions, operating characteristics, electrical ratings, and contact arrangements.

35 MACHINING STAINLESS—*Republic Steel, 3100 E 45th St, Cleveland 27, Ohio.* 28-page booklet gives speeds, feeds, and estimating data for machining all types of stainless used commonly on automatics. Information on tool form, section on how to find and correct difficulties, formulas and tables, and data on new screw thread standards.

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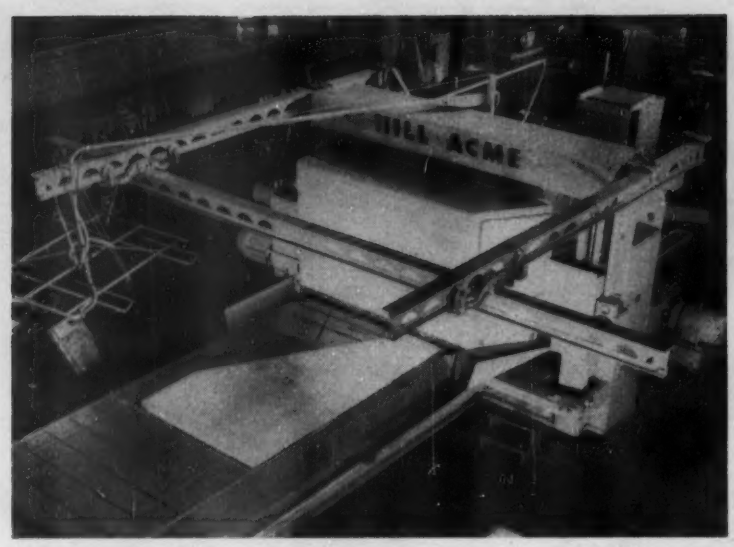
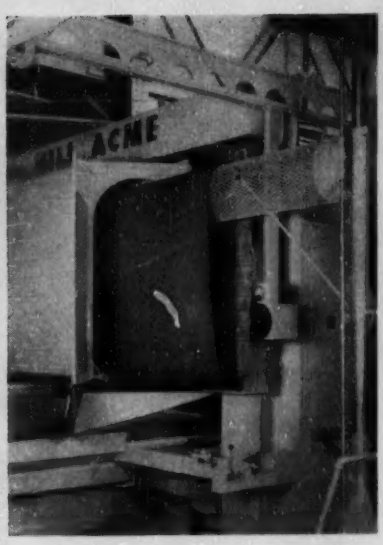




Hill Acme Builds Mammoth Belt Grinder

This abrasive-belt-grinding and polishing machine, said to be the world's largest, was built by the Hill Acme Company for the aircraft industry. Its function is to machine compound tapers on flat aluminum plates. The endless coarse-grit silicon-carbide abrasive-cloth belt is 138 in. long and has a maximum width of 86 in.

The double-housing grinder is powered by a 250-hp dc motor and incorporates a positive hydraulic reciprocating table drive which permits instantly variable speeds. It grinds the entire width and length of the aluminum plate or section through each pass of the table under the belt —is said to be equally efficient for heavy stock removal and grinding to close tolerances.

Floor-to-floor time required to produce individual aluminum tapered sections with the machine is estimated to be 50% below that of conventional skin milling. Subsequent operations of polishing aluminum sections to as low as 10 rms are accomplished with fine-grit belts.

MACHINE CONSTRUCTION

Components of the machine are of heavily ribbed welded-steel construction — except for the semi-steel columns that support the entire grinding head assembly, and the bed and table ways which are also semi-steel. The hand-scraped cast ways are keyed to both table and bed. Vee and flat ways are pressure-lubricated and protected with canvas way covers. Grinding head assembly is accurately fitted to semi-steel column ways which are machined and hand-scraped.

Two motors supply power for vertical operation of grinding head assembly. A 3-hp constant-speed motor, connecting by means of a gearbox to the elevating screws, raises and lowers entire grinding head assembly at rate of 5 ipm. A 1-hp motor, connected by magnetic clutch to elevating screws, positions and feeds the abrasive belt. Precision setting within 0.00025 in. is done by large indicator which records depth of cut in thousandths.

COMPONENT DETAILS

The reciprocating table (84 in. wide by 16 ft long) is actuated by two opposed pistons and cylinders together with low-pressure hydraulic pumps and valves. Heavy-duty pumps are operated by 20-hp motor. These pumps, together with valves for starting and stopping, as well as changing from high to low table speed and reversing, are located in self-contained steel tank. All controls are located on panel in front of machine.

Vertical head assembly uses two rolls—a dynamically balanced upper steel idler roll, and a lower rubber-covered contact which is the work roll. Pneumatic belt-centering device insures positive tracking and is adjustable to compensate for belt width. Spindle housing assembly of quill-type supports back end of contact roll, while front end is supported by accessible roller-bearing assembly. Both rolls are provided with pneumatic brakes. Acme reports the perfection of a pneumatic arrangement which rapidly raises and lowers the idler roll. It is said to allow changing wide belts in a few minutes. The mechanism also maintains constant and uniform tension.

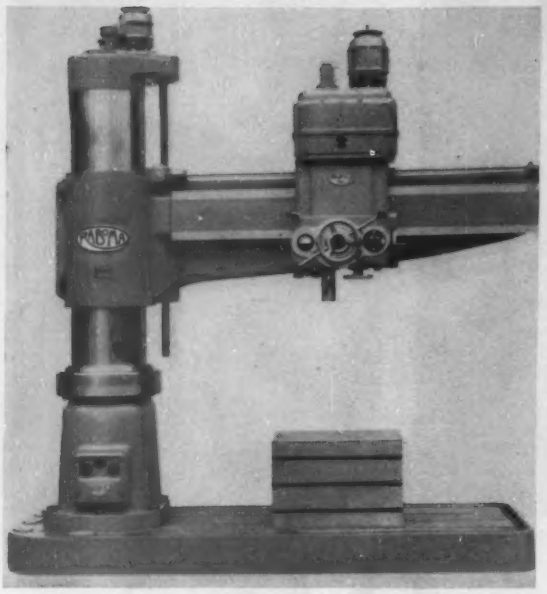
A vacuum chuck holds the work and is equipped with special gasket to conform to various shaped wing and fuselage sections to be ground. Safety features include interconnected vacuum switch and safety stops.

Any portion of vacuum chuck may be used at any time and un-used portion sealed off. Each small rectangular section is provided with its own orifice. The chuck can be tilted in any direction to produce single or compound taper.

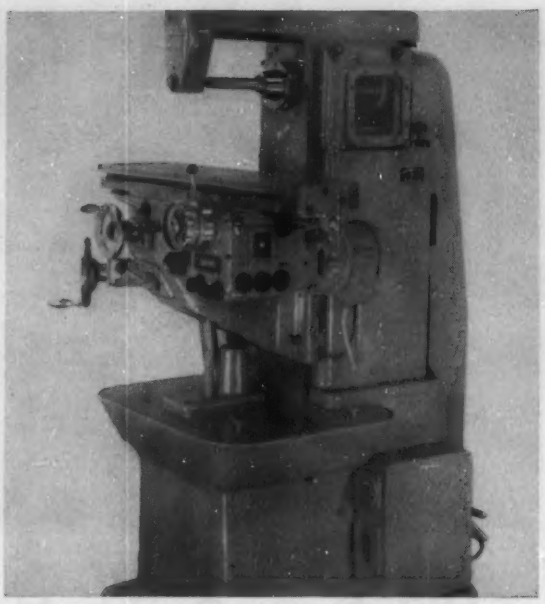
COOLANT SETUP

Both heavy grinding and finishing operations are performed wet—metallurgical changes will occur to aluminum aircraft sections if temperature increases beyond critical point. High-pressure coolant nozzles are directed at point of contact with enough pressure to break through air turbulence caused by high speed of belt. Also, coolant nozzles are directed against belt to prevent loading and jets in coolant-return troughs liquify sludge and move it to filter. Sludge may be salvaged and remelted.

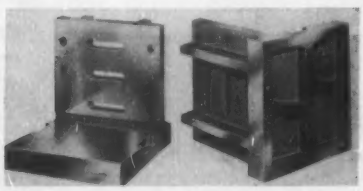
The Hill Acme Co, 1801 W 65th St, NW, Cleveland 2, Ohio



RADIAL DRILLING MACHINE was designed for maximum of simple and automatic control. Small dials can be set to desired feed and speed while machine is operating. On re-engagement of clutch, machine is set for new speed and feed (45-2800 rpm; 0.0008-0.040 in.). Automatic clamping of boring head to arm, and arm to column, is done by pushbuttons. The elevating mechanism has automatic cycle. Gradual engagement of clutch is automatic; spindle disengagement is by button. It is reported that blind-hole tapping can be done without tapping head. Three models (4.5-hp head motor) have max horizontal head travel of 26¼, 36, and 49½ in. — *Imported by Marac Machinery Corp, 1819 Broadway, NY 23, NY*



HORIZONTAL PRODUCTION MILLER, Steinel SH4AE, has power feed, rapid approach, and eight feeds independent of spindle speed. Feeds are engaged when lever is pushed left or right. Adjustable table feed stops change travel from fast approach to preselected power feed and stop travel after work. Quick reverse motion of loading position follows by changing position of feed lever. Machine is equipped with one drive motor and one feed motor. Equipment includes set of belts, three adjustable limit stops, four adjustable trip dogs for feed and quick traverse, coolant pan covers and guards, one-inch milling arbor, set of spanner wrenches, and grease gun — *Imported by Morey Machinery Co, 383 Lafayette St, New York 3, NY*



Taft-Peirce Angle Irons

Multiplex angle irons, designed for general-purpose use in processing tool and die work, are said to eliminate multiple setups and excessive handling of work in inspection rooms. Can also be used on boring mills, planers, and drillpresses.

Standard model, available from stock, is 12x12x12 in.; plain surface measures 9x12 in, and working surface at right angles is 10x12 in. Holes and slots provide for clamp bolts, and four tapped holes accommodate eye-bolts for ease of handling. Two recessed lips in base section provide means of clamping tool to machine or inspection tables. Both base and angle sections are ribbed to insure rigidity. All working surfaces are square within 0.0005 in. in 6 in.; parallelism of respective sides is held to a tolerance of 0.0005 in.

Each iron weighs approximately 95 lb. Price of standard model, $240; special sizes made to specifications.

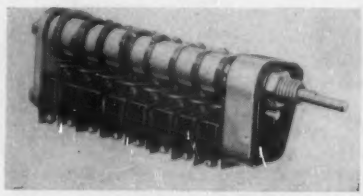
Taft-Peirce Mfg Co, Woonsocket, RI

Rinse Tank For Small Parts

Two-compartment rinse tank was designed for cleaning small parts after vapor blasting or liquid honing. Entire tank, inside and out, is hot dipped galvanized. One compartment is a hot solution tank with thermostatical control on shielded heating element; other compartment is a cold solution rinse.

Rinse tanks are compact on one frame. Made of welded steel construction, small shelf on back of each of the compartments is for placing parts to dry.

Vapor Blast Mfg Co, Dept RT, 3025 W Atkinson Ave, Milwaukee, Wis



Rotary Selector Switches

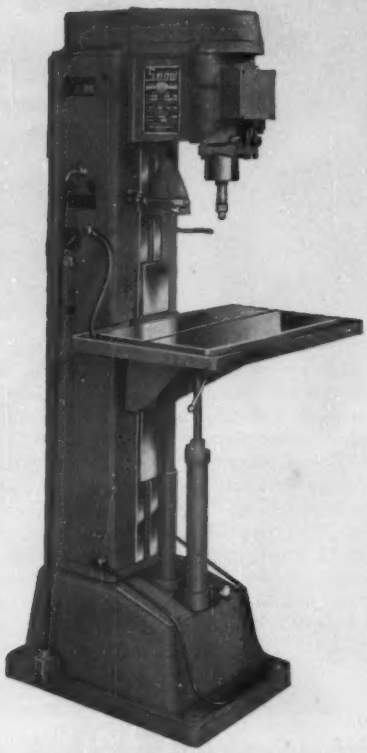
Series of subminiature rotary selector switches and new two-circuit double-break basic switch are available from Micro Switch. Selector switches offer means of switching as many as eight different circuits with one assembly. Virtually any switching sequence is possible. Eight-switch assembly requires 1 17/64-in.-dia mounting surface; length is less than 4 in.

Double-break switches control two isolated circuits. By snap-action spring, almost simultaneous break and make of both contacts is accomplished. Size is ½x½x1¼ in.

Micro Switch, Div Minneapolis-Honeywell Regulator Co, Freeport, Ill

SNOW MANUFACTURING COMPANY

455 EASTERN AVENUE • BELLWOOD, ILLINOIS



FULL UNIVERSAL
MACHINES
Electrically Operated—Air Controlled

...Drilling—TYPE "UD"

Capacities from #60 through 3/8" in two sizes

...Tapping—TYPE "UT"

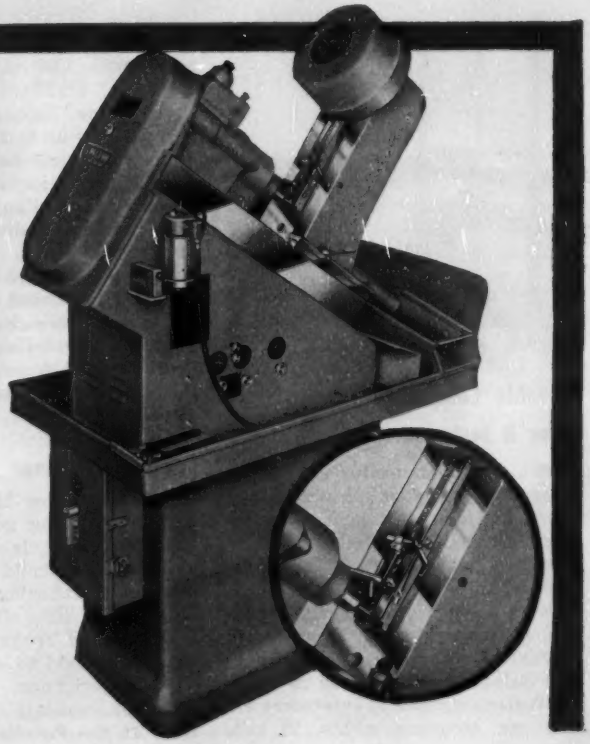
Capacities from #0 through 3/4" in four sizes

...Threading—TYPE "TR"

Capacities up to 1" in two sizes

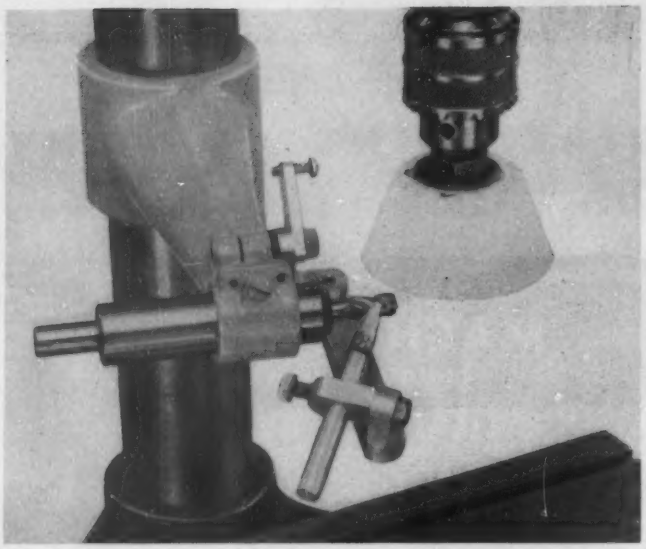
AUTOMATIC and SEMI-AUTOMATIC
JIGS and FIXTURES
for Indexing and Clamping

A complete line of basic Master Fixtures to permit adaptation of a wide range of parts at high production rate with low tooling cost.

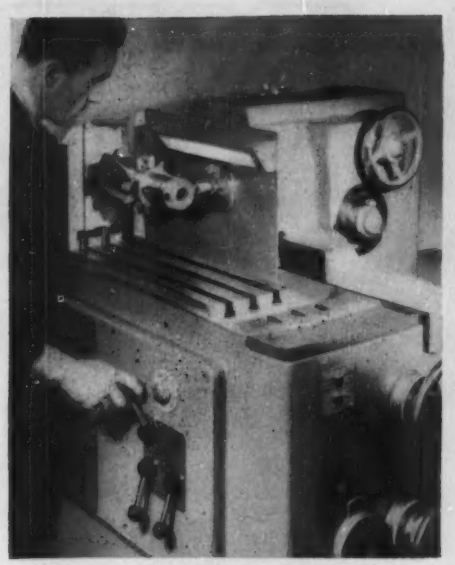


FULL AUTOMATIC
Nut Tapping Machines

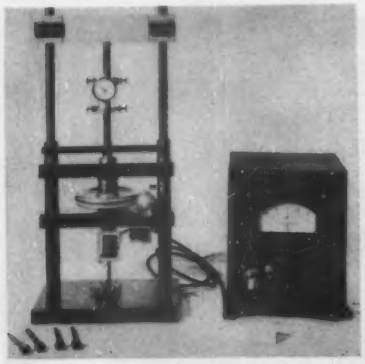
Completely automatic hopper feed nut tapping machines up to 5/8"—incorporating simplicity and low tooling cost. Standard taps are used. Precision class 3 and 4 fits and parallelism maintained at high speed and high production.



MILLING ATTACHMENT allows sharpening of end mills when drillpresses are equipped with this Waterborg unit. Only extras needed are emery wheel mounted in drill chuck and adjustable guide finger fastened on spindle support bracket. Cutters are placed in milling spindle which, with spindle bearing, is placed in horizontal position. Guide finger is then adjusted to support cutter on flute, just below cutting edge, with edge far enough ahead of center to provide desired degree of clearance. Grinding wheel is brought down to contact cutter directly above guide finger and cutting is done while cutter is being guided along finger, with drillpress spindle stop regulating depth of each cut. To sharpen end mills on end, grinding wheel is brought down across end of each flute. Price of the attachment is $6.50 — *Waterborg Machinery Co, 2830 Rapids Drive, Racine, Wis*



KEYWAY MILLING times are reported 3 times as high as conventional. Hurth LF 32 attains accuracy and speed by alternate, hydraulically controlled lowering and raising of spindles against set stops; vertical displacement adjustable from 0.08 to 0 in. Except for chucking and removing work, operation is automatic. Max dia of cutter is 1½ in. 15 spindle speeds range from 90 to 2240 rpm. Deep-feed rates are 0.00059, 0.00118, and 0.00236 ipr. Longitudinal feed of carriage provides 12 rates. Axial movement of spindle, 4¾ in. — *Imported by Kurt Orban Co, Inc, 205 E 42nd St, New York 17, NY*



Portable Comparator for Class B Instruments

Portable comparator for calibrating extensometers, compressometers, dial gages, and similar instruments has been introduced by Baldwin-Lima-Hamilton.

Elimination of mechanical linkages as a source of error is accomplished by use of a Microformer (miniature variable transformer) and null-balance indicator to apply small displacements to extensometers with an accuracy within 10 millionths of an inch for calibration. Instrument weighs only 44 lb as compared with 1200 lb for a National Bureau of Standards comparator of similar type. Extensometers having gage lengths up to 10 in. and ranges up to 0.250 in. can be checked. Standard equipment includes adapters for instruments used on 0.252, 0.357, and 0.505-in.-dia rounds; other adapters available.

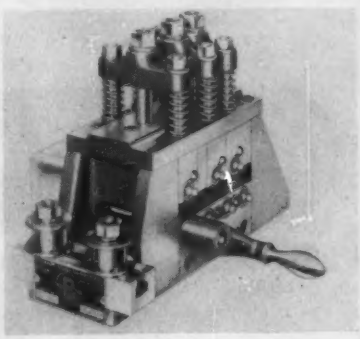
Over-all dimensions are 25x10x7 in. Gage blocks can be supplied with instrument when desired. Operating details and specifications contained in Bulletin 4210.

Baldwin-Lima-Hamilton Corp, Philadelphia 42, Pa

Lubricant Cleaner

Lubricant cleaner is said to de-rust without harming generic metal, at the same time cleaning and lubricating. It is claimed that it prevents clogging and sticking of moving parts because of dirt, oil, erasures, and inks. Termed Technilube, the product is also said to obviate need for further lubrication.

Eel-Tex Chemical Co, Suite 307, 485 Bush St, San Francisco, Calif



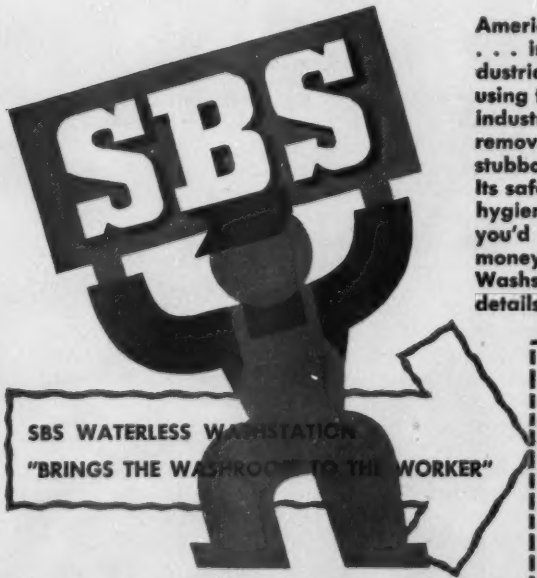
Stock Straighteners

Stock straighteners are made in several standard sizes to meet most requirements and special sizes can be fabricated. Models include five-roll type for heavier stock and seven- or nine-roll types for thinner, softer materials. Stock width capacity ranges from 2 to 8 in. Where thin materials are to be straightened, and it is impractical to pull material through, motor-driven straighteners with power-driven entering rolls are available.

Durant Tool Supply Co, 136 S Water St, Providence 3, RI

NEW IDEA
Sweeping American Industry

SBS Waterless Washstations Can Cut Costs, Save Money For You



American industry has a "new look" . . . along production lines . . . in critical trouble spots . . . wherever hard-to-remove industrial soils exist . . . you'll see SBS Waterless Washstations using famous SBS-30 Waterless Skin Cleanser. Proved by 6 years industrial usage, SBS-30 is unchallenged in its ability to SAFELY remove embedded grease, grime, paint, asphalt and most other stubborn soils — WITHOUT WATER.

Its safety has won the approval of some of the largest industrial hygiene and medical departments. Companies whose names you'd recognize immediately have had conclusive proof of the money-saving, production-increasing abilities of SBS Waterless Washstations. Find out the story for yourself, send for complete details.

SUGAR BEET PRODUCTS CO., SAGINAW, MICH.

Sugar Beet Products Co., Saginaw 4, Michigan
SEND details on the new SBS Waterless Washstation.

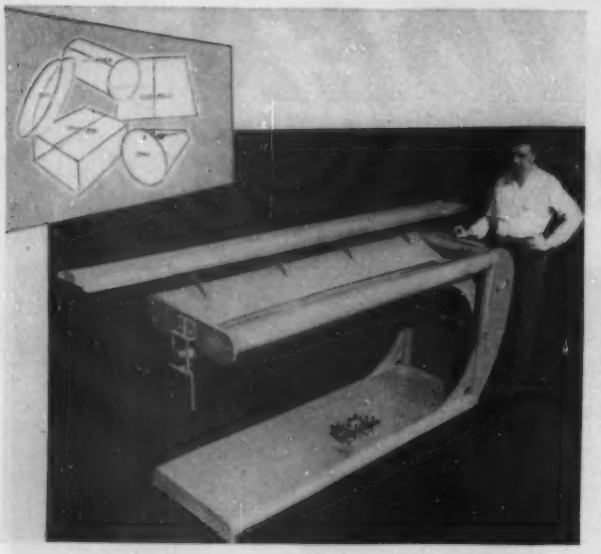
Name_____

Title_____

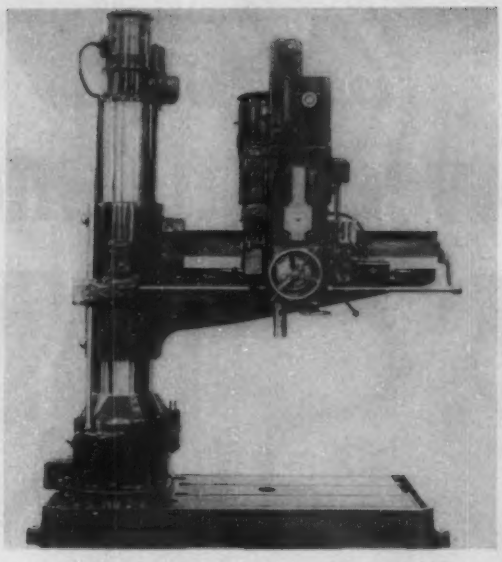
Company_____

Address_____

City_____ Zone____ State_____



LONGITUDINAL WELDING FIXTURE offers accessibility and visibility with carriage and controls opposite operator within convenient reach. It restrains and aligns sheet or plate edges on materials from 0.005 to 1-in. thick without requiring change of mandrel machined to receive several copper back-up bars by sliding into machined groove. By loosening setscrew, mandrel is rotated until required bar is in position. Available lengths range from 2 to 12 ft. Machine can be had as shown or with carriages, torches, heads, and rod feeds — *Airline Welding and Engineering, 785 N Prairie Ave, Hawthorne, Calif*



RADIAL DRILLING MACHINE, model E27A, has 36 spindle speeds (8½ to 800 rpm) and 9 rates of power feed. Driving gears are heat-treated nickel chrome steel; all drive shafts are ground carbon steel. Saddle contains centralized controls. Machine has almost full-ball-bearing construction and nickel chrome change gears run in oil. Other features: ball-bearing rollers for racking; reverse at any speed; automatic trip for depth drill; 15-in. column — *Imported by British Industries Corp, Dept AM, 164 Duane St, NY 13, NY*

KSM Battery Unit For Stud Welding

Portable battery unit supplying independent power for welding studs up to ½-in. base diameter is recommended for stud welding when no power lines are available. Completely integrated and independent of power lines, except for recharging, unit is readily adaptable to all stud-welding installations within its power capacity.

Tap selector switch, calibrated in weld-base diameters, regulates current supply. Off position eliminates external terminal short-circuiting. Output terminals for connections to control box consist of two threaded studs and wing nuts—ammeter indicates charging current.

Twelve heavy-duty wet batteries of 150 amp-hour rating are kept charged by integral automatic charger which test-checks open-circuit battery voltage every 10 min. Access to twelve batteries, confined by steel partitions to prevent accidental damage, is made easy by piano-hinged covers on both sides of unit.

KSM Products, Inc, 322 Woodland Ave, Merchantville 8, NJ

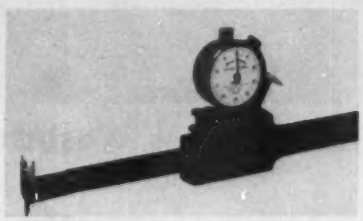
Goodrich Conveyor Belts

Line of lightweight conveyor belts, introduced by Goodrich, includes a Koroseal belt said to have excellent resistance to abrasion, oils, grease, and most acids. Tough, flexible material has a smooth, non-porous surface designed to resist flaking or checking.

Highseal and Kleenseal belts are available in "eye-rest" green color to reduce glare and eye strain during inspection work. Economy black belt, designed for low-cost operation, is said to reduce maintenance problems caused by excessive changes in belt length.

Lightweight CP special conveyor fabric used in the new line reportedly has high moisture-resistance when impregnated with special compounds, and long flex life.

B F Goodrich Co, Akron, Ohio



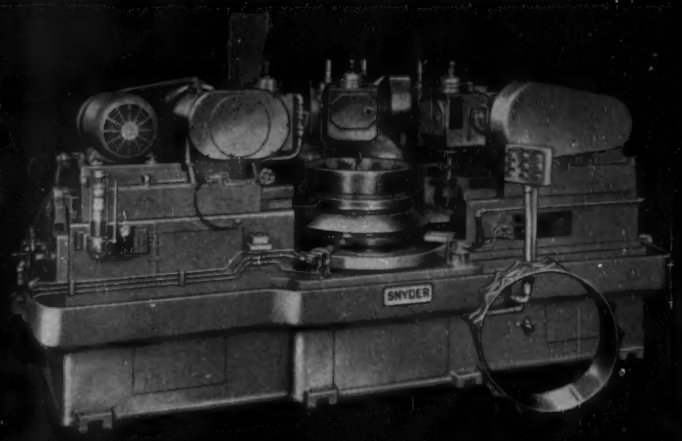
Snap Ring Groove Gages

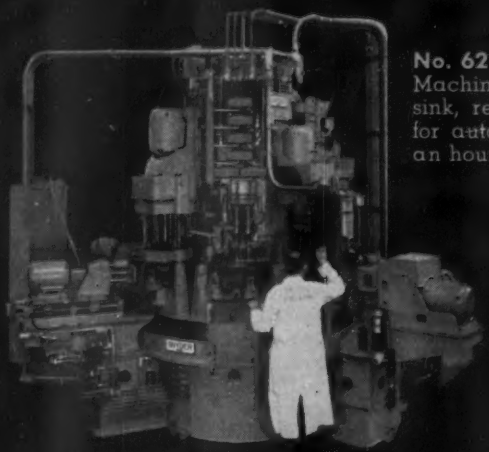
Reliant dial indicator gages have been designed for inspection of internal snap ring grooves from 0.240 to 5.270 dia. In addition, these instruments may also be used for checking out-of-round, inside diameters, deep holes, recesses, taper, inside spherical radii.

Self-centering instruments are set directly to a master ring gage. Slight rocking motion in one direction quickly indicates minimum reading of the diameter on indicator; gaging motion is transferred directly through a lever. With use of an indicator graduated to 0.0001 in., internal dimensions having very close tolerances can be precisely inspected. Specifications provided in Catalog 54D.

Reliant Industries, 4947 Firestone Blvd, South Gate, Calif

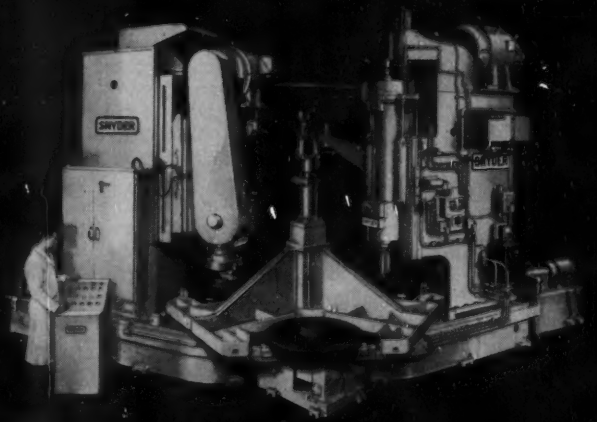
No. 68326—A three-way machine to profile mill four rows of lugs on a compressor casing for jet engines. 135 minutes are used to perform this operation in 3 steps.





No. 62207—Six Station Center Column Machine to drill, counterbore, countersink, ream and tap converter housing for automatic transmissions. 91 pieces an hour at 80% efficiency.

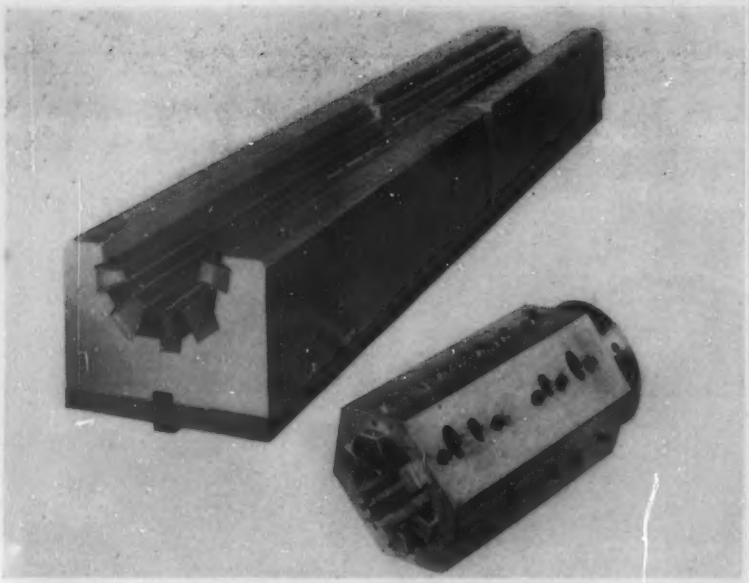
No. 67677—Two-Station, Vertical Column, Boring and Facing Machine to rough bore and face the hub of heavy railroad car wheels. Bore 6¾" x 7" long. 33 units an hour at 100% efficiency.



SPECIALS by SNYDER

TOOL & ENGINEERING COMPANY
3400 E. Lafayette, Detroit 7, Michigan

29 Years of Successful Cooperation with Leading American Industries



Broaches Finish Surface On Circular Metal Parts

Line of broaches has been introduced for finishing external surfaces on circular metal parts, such as slots, flats, notches, and contours usually produced by index or multiple milling operations. An external surface model and an internal one are made in a wide variety of sizes.

Surface broach (left) can be mounted on ram of single or dual-ram surface broaching machines. It processes up to half the periphery of a part in a single pass; if entire periphery is to be broached, part, mounted on a fixture on machine table, is indexed and completed in a second pass. External models consist of a steel main broach holder and steel sub-holders which support the HSS broach section inserts. When closely spaced narrow slots are broached in parts, inserts are made in the form of blades, bolted to the sides of steel sub-holder. Main holder is keyed to a sub-base, which in turn is keyed to ram of machine.

Internal unit is mounted on table of utility hydraulic press, and finishes entire periphery. Part is mounted on a holder on end of the press piston rod and pushed down through the broach. Two or more parts can be processed with each stroke by mounting more than one broach on table and extra holders on a ram adapter. Holder includes a pilot at the base for positive location on broaching machine table in relation to press piston rod.

Size of circular-shaped parts that can be handled by either tool is limited only by tonnage and stroke capacity, and fixture clearances of broaching machine.

National Broach & Machine Co, 5600 St Jean Ave, Detroit 13, Mich

Constant-Voltage Welder Has Automatic Properties

Hobart dc arc welder features separately excited initial current and automatic control on preset current, regardless of wire-feed speed. Settings can range from 20 to 40 volts, and three models put out 400, 600, or 900 amps, 2 to 3 phase, 220/440 (dual) or 550 (single) volts.

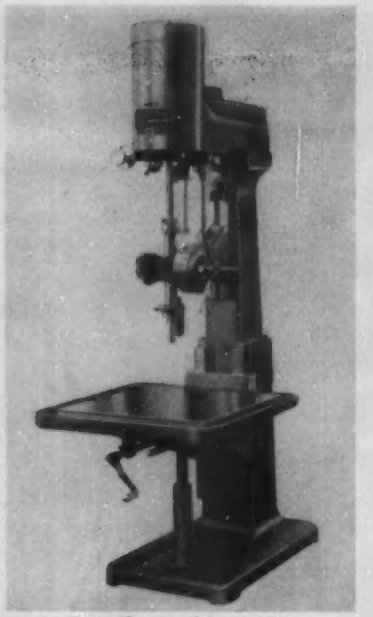
Exciter has 1-kw overload capacity; outlets allow draining this for operating shielded-arc or submerged-arc equipment controlled by welder.

Hobart Brothers Co, Troy, O

Heavy-Duty Dresser

Newman Model No. 5 is equipped with special sealed ball bearings and high-tensile hardened steel cutters for foundry and heavy grinding. Cutters are interchangeable with abrasive wheels as used on Model No. 4, which is also now available with cutters. Wheels are changed by loosening two locknuts, removing retainer screws, and lifting out entire assembly. Wheel nut is removed and the wheels are inserted.

L Newman Tool Die and Machine Work, 1001 24th St, Oakland 7, Calif



Motor-Spindle Machines Improved by Edlund

Edlund Model 2 MS with 12- or 15-in. overhang has from 1 to 8 spindles. Designed for general production work and toolroom use, 2-hp motor gives drilling capacity of 1 in. with additional capacity of 1¼ in. using back gears. In addition, models can be furnished with Edlund semi-automatic power feed, reversing motor tapper, and leadscrew tapper. These attachments can be used in any desired combination on multiple spindle machines to meet specific production requirements. Direct-drive rpm spindle speeds range from 600 to 3600 with additional slower speeds of 115 to 900 rpm obtainable by application of back gears.

The Model 4 MS machine is for heavy production work. It incorporates all features of the Model 2 with heavier construction and drilling capacities to 1½ in. Direct-drive spindle speeds range from 450 to 1200 rpm and with back gear from 112 to 300 rpm. One- to 4-spindle machines are available with either 12- or 16-in. overhang.

All Edlund motor-spindle machines can be fitted with flange quill for multiple head mounting. An important feature is reported to be the extra-heavy construction which provides rigidity demanded for accuracy and long life. Bearing surface for spindle sleeve in sliding arm and for sliding arm on frame is extra long. Machine base is also extra-heavy, with long, wide table bearing to reduce deflection.

Edlund Machinery Co, Inc, Cortland 2, NY

McCAULEY
INDUSTRIAL CORPORATION

DAYTON, OHIO

threads propeller blade shanks

with

SIDNEY HEAVY-DUTY LATHES

THE SIDNEY MACHINE TOOL COMPANY
50th Year
of service to
AMERICAN INDUSTRY
1904 - 1954
SIDNEY · OHIO

Sidney Lathes are so flexible, so adaptable that there seems to be no end to where, when and how they can prove their worth. In this photo, they are threading propeller blade shanks . . . a job which requires precision of the highest order . . . running steadily and with satisfactory results.

It's the same story in hundreds of plants . . .

SIDNEY HEAVY-DUTY LATHES
DO MORE JOBS PER HOUR . . .
AT LEAST COST PER JOB

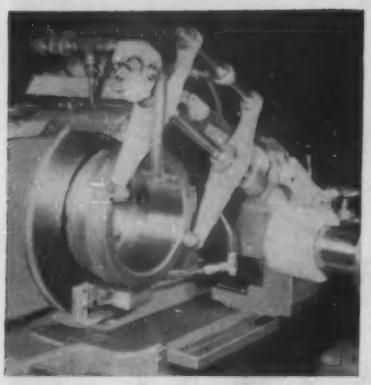
Write for bulletins

Think this over:

Postwar designed machines show more than one-third greater production capacity. Over-age, obsolete machines—more than 1,000,000 of them—are costing more by $1,000,000,000.00 to do the same work as new machines and should be replaced. Replace your obsolete turning-equipment with modern SIDNEY LATHES.

THE SIDNEY MACHINE TOOL CO. • SIDNEY, OHIO

Builders of Precision Machinery since 1904



Shoe Type Fixture for Centerless Internal Grinding

Bryant announces a shoe-type centerless internal-grinding fixture available as tooling on Bryant machines. Fixture insures bore grinding to uniform wall thickness and concentricity held as close as 0.0001 in. or less. Roundness and straightness of ground bore depend on accuracy of piece's outer surface and squareness of locating face.

Workpiece is suported in two shoes which are attached to stationary fixture plate. One shoe is located directly on the work and other is on horizontal centerline of work toward rear of machine, resisting grinding wheel forces. Work is rotated on carbide faces of shoes by driver plate machined to provide high-precision, true-running face. Work rotation is clockwise or opposite to standard practice in internal grinding. Work drive is entirely through friction generated by clamping reference face of work against driver plate. In some cases driver plate can be magnetic.

Clamping pressure is applied by pair of ball bearings mounted in equalizing yoke. Outer surface of ball bearings runs on front-end face of workpiece. Clamping loads are moderate and clamping through faces of work markedly reduces the possibility of distortion.

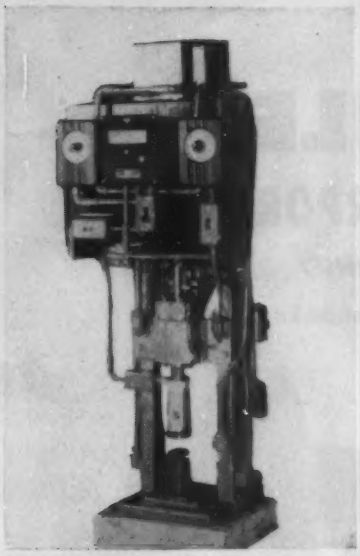
Bryant Chucking Grinder Co, Springfield, Vt

Versatile Line Marker

Model 1-10 safety line marker has a 10-gal. paint tank and marks single lines 2½ to 5 in. in width, and up to 8000 ft per hr of 4-in. line.

Paint spray assembly, with M-B Jet Cup, is at right front for maneuverability. The 1-hp engine of the hand-propelled unit uses only a gallon of gasoline a day. Can also be used as a production paint spray unit.

M-B Corp, New Holstein, Wis

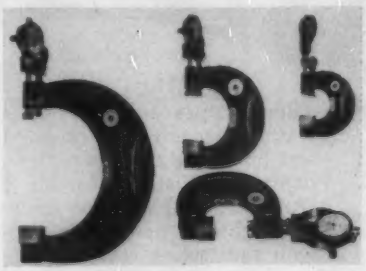


Potting Press Molds Two Kinds of Shot

Either granular or preformed shot can be fed to Electro-Snap Switch potting press at its receiving jacket. Press features interchangeable heads, molding speed as high as every 2 sec, and melting temperatures from 115 to 600F with close plasticizer control.

Material is fed from front cavity or rear hopper, which has mechanical agitation. Two starting switches must be depressed to start cycle, and an emergency switch stops press and returns it to zero position.

Electro-Snap Switch & Mfg Co, 4218 W Lake St, Chicago 24

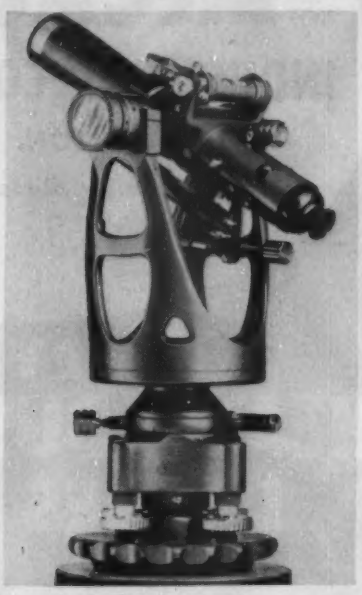


Standard Gage Dializers In Extended Size Range

Dializers to convert standard (AGD) adjustable limit snap gage frames to dial snap gages are now available with either a 1¾ or 2¼-in.-dia indicator. Indicator graduations of 0.001, 0.00025, 0.0005, and 0.0001 in. can be furnished. Dializer with a greater range, when using a 0.0001-in. graduated indicator, can now be obtained than was formerly possible.

Smallest indicators are hooded; larger ones have protective guards designed so as to allow gage to be placed on either side or stood on its end without resting on indicator case.

Standard Gage Co, Poughkeepsie, NY



New Optical Instruments Available from Brunson

Brunson has introduced two new instruments—a jig transit and an optical transit square—said to make it possible to reduce errors in alignment to less than 0.001 in. Tooling aids are designed to establish and maintain vertical plane for setting points accurately and quickly. They were developed in cooperation with tool engineers in the aircraft industry.

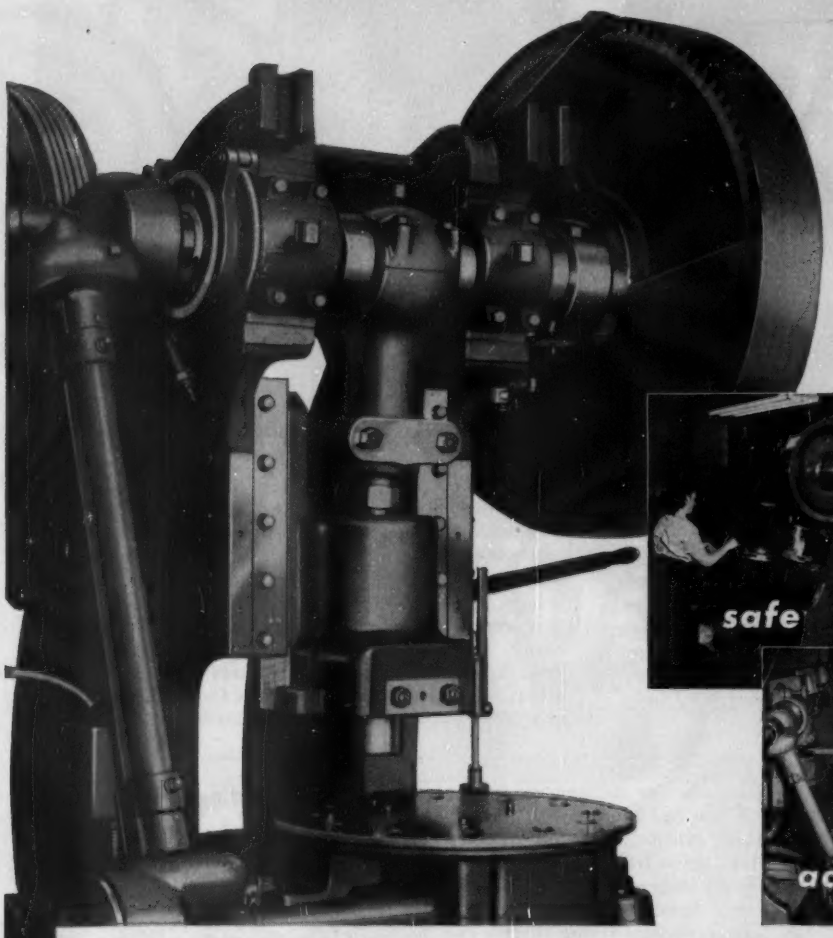
The jig transit is a special version of the Brunson engineer transit. It has a mirror mounted on the end of the telescope axis and paralleling line of sight; it has a telescope of higher power and shorter minimum focus. Procedure used to establish vertical plane is based on auto-reflection principle. Alignment telescope and target set up main line of sight; transit is interposed so that mirror reflects reticle image back into telescope. Position of transit is adjusted until cross hairs of reflected image superimpose on cross hairs of reticle in alignment telescope.

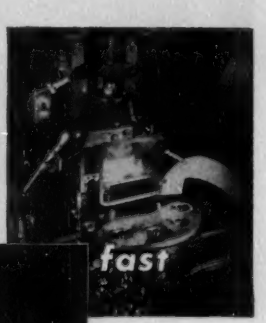
Optical transit square represents extension of jig transit application. Instrument resembles jig transit but has hollow axis. One end of axis is enclosed by clear window, other by partially coated window. Because of the hollow axis the accuracy of this instrument can be readily verified.

Charles Bruning Co, Inc, 4700 Montrose Ave, Chicago 41, Ill

Now's the time to discard
costly, obsolete methods . . . replace with FEDERALS for

more profitable presswork!





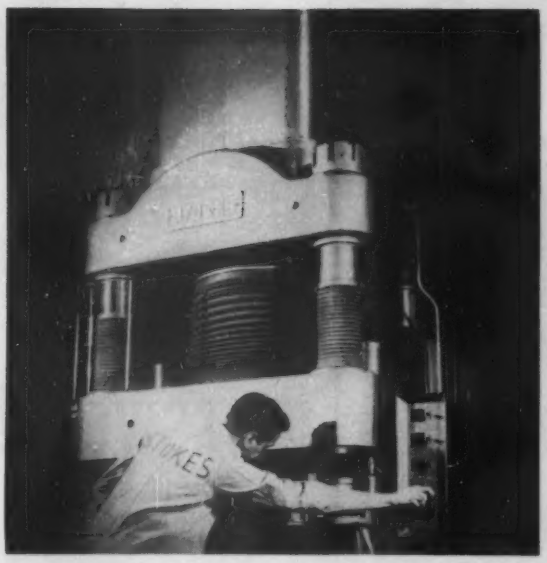
FEDERAL DIAL FEED PRESSES

No. 7 Dial Feed—
Capacity, 80 tons

Write for new Dial Feed Catalog

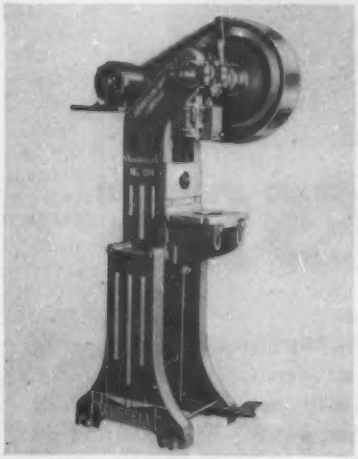
THE FEDERAL PRESS COMPANY
501 Division Street, Elkhart, Indiana

Don't let obsolete methods and equipment handicap your operation, drain your profits. Modernize with new Federal Dial Feed Presses. Then watch your production go up, and costs go down! Surveys show many a Federal Dial Feed doing three to five times the work of a standard press . . . cutting down-time, reducing accidents, eliminating more expensive equipment. These rugged, precision-built, versatile presses incorporate the finest materials and workmanship. Available in eight sizes, from 6 to 80 ton capacity. Automatic feeds and ejectors if desired.



AUTOMATIC MOLDING PRESS for powder metal is first of new 300-ton series. Parts to 12-in. dia and 3-in. thickness can be compacted. Molds with max depth of fill of 8 in. can be handled. Control over pressing cycle is completely automatic. For thick parts, operation is at rate of 4 spm; thinner parts, rate increases to max of 10 spm. Each ram is independent with own hydraulic pump and volume control. Adjustment of threaded stops accurately controls thickness and density of part. Shuttle-type feed shoe provides accurate filling of mold. Control panel allows conversion from full- to semi-automatic to manual — *F J Stokes Machine Co, 5500 Tabor Rd, Philadelphia 20, Pa*

POWDER METAL HYDRAULIC PRESS is first of new line. It has 1250-ton double-acting top ram and 900-ton side double-acting ram; can be used for split-die pressing of powders and for titanium and zirconium sponge. Top and side rams can be operated independently. Press has all-welded steel construction, floor-area of 8x10 ft, and is 22 ft high. Max opening is about 8 ft. Hydraulic power unit is powered by 40-hp electric motor, has 250-gal. oil reservoir. Side ram has no obstructing tie rods and working area exceeds 2x4 ft. Other presses for powder metal processing and high-speed hydraulic forging have capacity to 2000 tons — *Oilpower Engrg Co, 434 State St, Schenectady 5, NY*

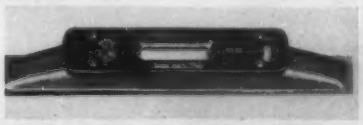


Rousselle Press Features Additional Die Space

Additional die space and extra adaptability are features of the bench or floor models of this press. Bed table has 4-in.-dia hole for clear-through slug clearance. Bed can be mounted in six different keyed positions, in 1-in. steps, providing die space up to 10 in., or it can be quickly removed for accessibility to horn hole, also for drilling die set holes.

When bed is removed, special fixtures can be mounted directly to press since frame is accurately machined and can be drilled, tapped, or bored. Bench models have reversible legs so vertical frame surface can be mounted flush with edge of bench to provide obstruction-free clearance.

Service Machine Co, 7629 S Ashland Ave, Chicago 20, Ill



Precision Level

Precision level has ground and graduated dial of 10-sec accuracy, one division equalling 0.0005 in. per ft. Special alloy base was designed for resistance to temperature change; top plate is made of non-conductive insulating material. Screws are 65 tpi for fine adjustment. Machined surfaces are scraped, non-machined surfaces have black crackle finish. Level is 15 in. long, 3 in. high and 1½ in. wide, and sell for $75.

The Lufkin Rule Co, Saginaw, Mich 10F6

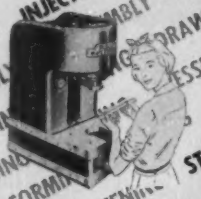
Automatic Sorting for Continuous Strip Production

Classifying unit does automatic sorting of continuous strip and plate production. Designed to function with AccuRay non-contacting, radiation gages, unit processes strip after it has been measured. Complete installation includes source-detector unit, recorder console, and classifier.

Classifier provides percentage deviation tolerance limits, permitting strip to be classified by specified percentage of deviation from tolerance. This means thickness ranges can be changed without requiring resetting tolerance limits. High and low limits can be adjusted independently of each other. Classifier is housed in separate cabinet with circuitry mounted on swing panel.

All variations in thickness are charted on the AccuRay recorder in the operator's panel and indicated on the classifier panel lights. When strip varies above or below tolerance, classifier actuates a gate down the line from shear, separating cut strip into reject and saleable stacks.

Industrial Nucleonics Corp, 1205 Chesapeake Ave, Columbus, Ohio



If your production involves
any of these operations

MAKE SURE

you know why *it pays to do it with*

MULTIPRESS®

the multi-purpose tool for cutting production costs

DENISON Hydr OIL ics

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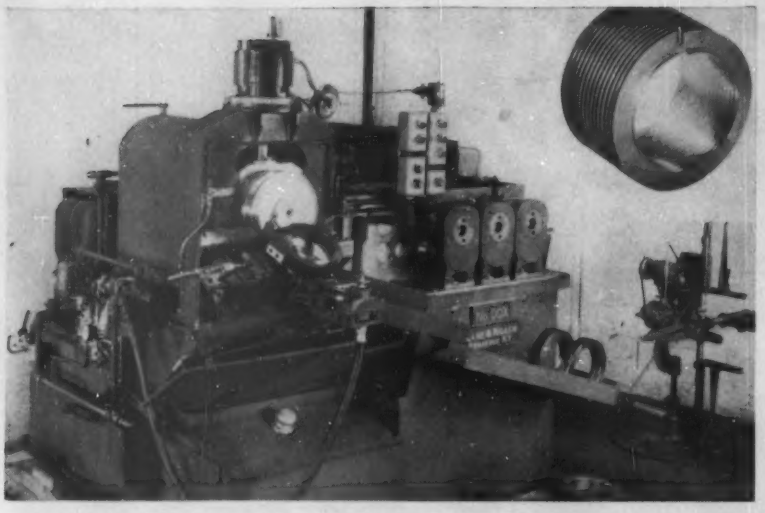
MULTIPRESS offers a wide range of sizes in both bench-type and floor models. Capacities range from one ton to 75 tons—and their efficient hydraulic power handles operations normally requiring an even wider range of pressures. An extensive choice of manual and automatic controls—plus interlocking automatic feeds, indexing tables and other accessories—make Multipress one of the most versatile production tools available to industry. Write today for your copy of the bulletin "MULTIPRESS—and how YOU can use it."

THE DENISON ENGINEERING CO., 1164 Dublin Rd., COLUMBUS 16, OHIO



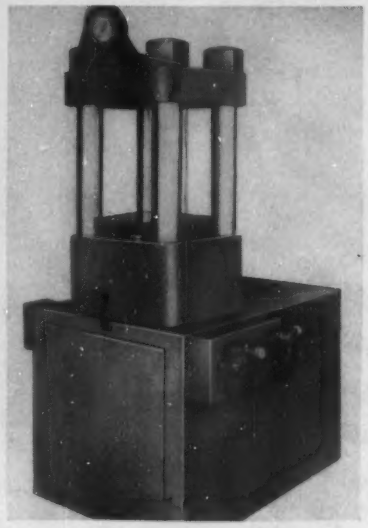
COLD-ROLL-FORMING machine, No. 00X, with No. 2LS coiler and cutoff, produces cooling fins used on sealed refrigerator compressor units. Stock is taken from coil 1⅜ in. wide x 0.044 in. thick. Production is 300 per hr of 5½-turn coils. Sequence of operation: form strips into ⅜ x 1¼-in. angle section; coil formed angle into 6 31/32-in. ID coils; automatic cutoff of completed fin coils. Cutting stroke is activated by single acting hydraulic cylinder and return by spring action. Cyclomonitor controls number of rings per coil; cutoff is adjustable for coil diameter — *Kane & Roach, Inc, Syracuse 4, NY*

Test Chamber Provides Alternating Temperatures

Automatic testing chamber cycles test parts through alternate hot and cold temperatures. Chamber is 30x11x16 in. First low temperature of −120 F is produced, then temperature of +200 F. Cycle may be repeated 100 times. Holding time at high and low levels is variable with dual-set timer which determines half-cycle time from 0 to 120 min.

To allow automatic cycling, unit has been equipped with explosion-proof and water-proof strip heaters rated at 3500 watts and automatic programming controls.

Cincinnati Sub-Zero Products Co, 3932 Reading Road, Cincinnati 29, Ohio



M&N Hydraulic Press Has Improved Power System

M&N hydraulic hobbing press is reported to utilize simplified and approved hydraulic power system which eliminates in-line mounted hydraulic controls with excessive piping and fitting requirements, and does away with unnecessary strain placed on lines by weight of control valves.

Subplate serves as readily accessible mounting for necessary control valves. Each valve is held in place by four screws and sealed with reusable neoprene O-rings. Valves mounted in this manner may be easily removed for maintenance or inspection.

With valves mounted in close proximity, advantage of system lies not only in saving of space and piping, but in reducing loss of pressure in the lines.

The M & N Hydraulic Press Co, Clifton, NJ

Proximity Pick-Up Impulse Generator

Model 4900 impulse generator was designed as low speed complement to Model 3010A. As a hf-carrier-operated transducer it may be excited either by magnetic or non-magnetic metals. It may be used to indicate mechanical or electrical counting, linear or angular position, rate of travel, sequence timing, vibration frequency, angular or linear speed, or other functions which involve moving metal components. It consists of transducer connected by 10-ft cable to control unit which contains power supply. It produces dc voltage of constant amplitude when any metallic mass is brought near pick-up. Voltage remains constant when exciting metal is in close proximity, and drops to zero when it is removed. Constant output voltage is independent of speed of actuating mass or pick-up spacing. It will operate at any rate from 0 to 12,000 times per min. Special units can be actuated by presence of exciting metal several inches away from pick-up.

Electro Products Laboratories, Inc, 4501 N Ravenswood Ave, Chicago 40, Ill

Battery Changing In Five Minutes

Battery-changing system was designed to bring charged batteries to lift truck. Two special steel skids with bed of rollers mounted in anti-friction bearings hold two batteries; charged battery is placed on one half of skid, transported by powerized hand truck or fork-lift from central charging room. One side of compartment is removed and discharged battery is pushed onto vacant half of skid; skid is moved a few feet and charged battery is pushed into compartment. Hand truck returns the skid to charging room.

Gould-National Batteries, Inc, Stone & Calhoun Sts, Trenton 7, NJ

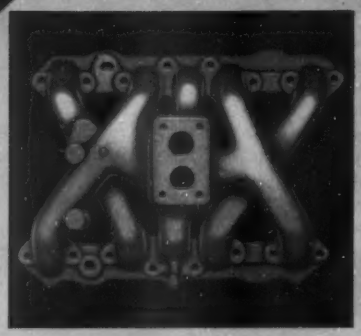
PEERLESS

ENGINEERING EXCELLENCE

that does the Never-Before

NOW

like this short Transfer with Overhead Return Conveyor— created to do a tough job in minimum floor area!



Part and Production: Intake Manifold for a new leading V-8 Engine. 180 pieces per hour at 100% efficiency.

Type of Specialized Production Equipment: 6-Station Automatic In-Line Transfer-Type Drilling-and-Tapping Machine with Automatic Overhead Pallet Return.

Tooling: Single-Place Pallet-Type Fixture with Manual Clamping. Anti-friction Drill and Individual Lead-Screw Tapping Heads.

BEFORE this PEERLESS, Plant Engineers were told that it was impossible to make a Transfer Machine which could be installed in such a small floor area.

NOW this PEERLESS, with specially-designed Overhead Pallet-Return Mechanism, is doing the job—setting a new high in maximum use of floor space!

Built to process all angular and bastard holes on Intake Manifolds, this PEERLESS was engineered for great flexibility—

Flexibility to take care of engineering changes if motor parts are altered.

Isn't this the kind of Engineering Excellence you want for your Specialized Production Equipment?

See other examples of PEERLESS Engineering Excellence that does the Never-Before, NOW!

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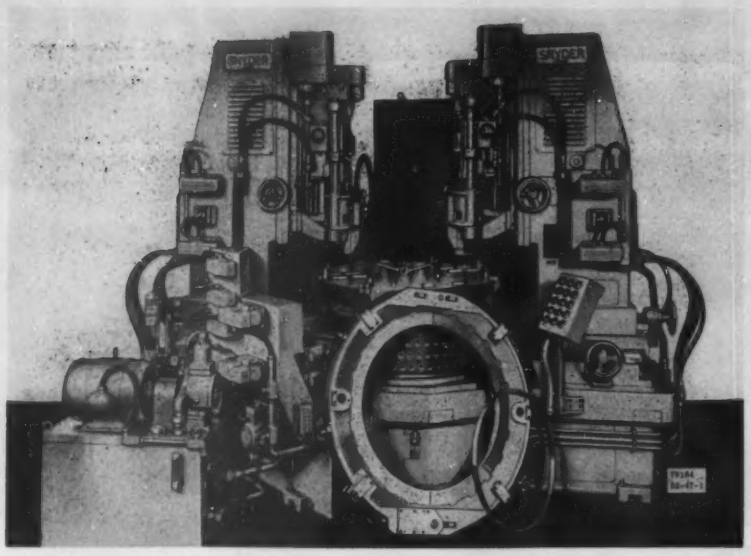
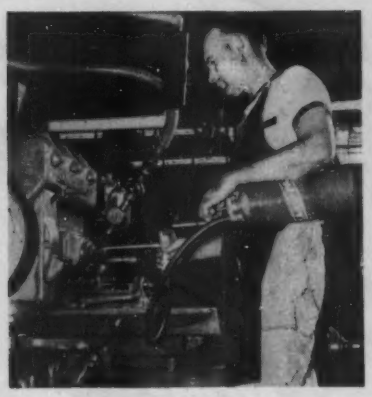
PEERLESS

SPECIALIZED PRODUCTION EQUIPMENT



AUTOMATIC MACHINE drills and reams holes in rims of outer shroud spacers for jet engines, is adaptable to processing other similar parts. Spacing between holes varies from part to part. Machine consists of fixture mounted on index table on either side of which is a column supporting hydraulic drill units. Columns are adjustable to permit positioning spindles for different size parts. Index table is designed to produce minimum indexes of basic hole spacing angle. A control drum controls the index and selects proper shot pin for locating the table. Spindle speeds vary from 640 to 2240 rpm; feeds from 1.75 ipm to 12 ipm; stroke is 8 in. Coolant supply is in separate tank; lubrication is from central hand-operated system — *Snyder Tool & Engineering Co, 3400 E Lafayette, Detroit 7, Mich*



Portable Lubricator Is Air-Primed

Air-primed portable lubricator needs no compressor, consists of cylindrical tank holding 5 lb of grease, handy carrying strap, hose and control nozzle. Hand pump primes unit with air pressure in a minute. Unit weighs 15 lb, filled. It is said to be powerful enough to crack any fitting. Other features include visual grease level indicator, volume control nozzle, full swiveling, pressure booster feature. Price is $24.95.

Aro-Fil gun filler, companion unit to Aro-Pak described above, enables user to quickly and easily fill Aro-Pak. Price is $10.95.

Aro Equipment Co, Bryan, Ohio

Hydraulic Pusher Attachment For Palletless Handling

Hydraulic pusher device for use in hydraulically actuated fork trucks provides means for mechanically pushing load off truck's forks and is designed principally for handling loads without pallets. Pusher unit consists of vertical load screen guided by a pair of pantographs. Power to extend and retract screen is supplied by telescoping, double-acting hydraulic cylinder acting through specially located thrust arms. Forces applied to both sides of screen are equalized by tieing linkage together across face of truck. All pin connections are of hardened steel and mounted in hardened steel bushings. Each pin is equipped with a pressure grease fitting.

Elwell-Parker Electric Co, 4205 St. Clair Ave, Cleveland 3, Ohio

Coil-Type Demagnetizer

Coil-type unit removes magnetism from tools and small production parts. Opening is 3¾ in. in diameter and unobstructed. Quick passing into opening is reported sufficient to completely demagnetize object. No contact with part is required.

Control is by pushbutton; unit operates on 110 v, 60 cycle. It may also be used to magnetize.

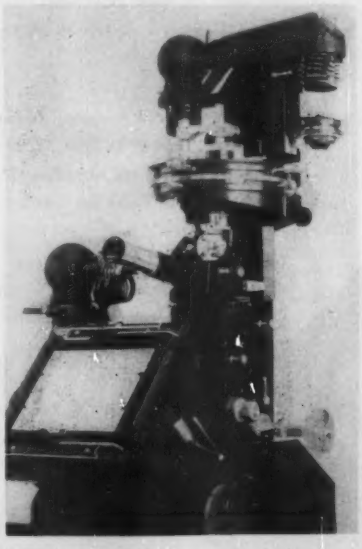
L-W Chuck Co, 25 S St Clair St, Toledo 4, Ohio

Gage Block Set Checks Micrometers

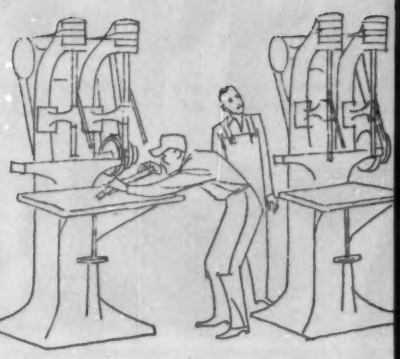
A 9-piece set of gage blocks offers 331 different combinations in 1/64 and 1/100-in. increments for setting micrometers and checking lead errors. Blocks are said to be accurate within 0.000005 in. They are first checked and set by Ultra-Chex length standards to dimension required.

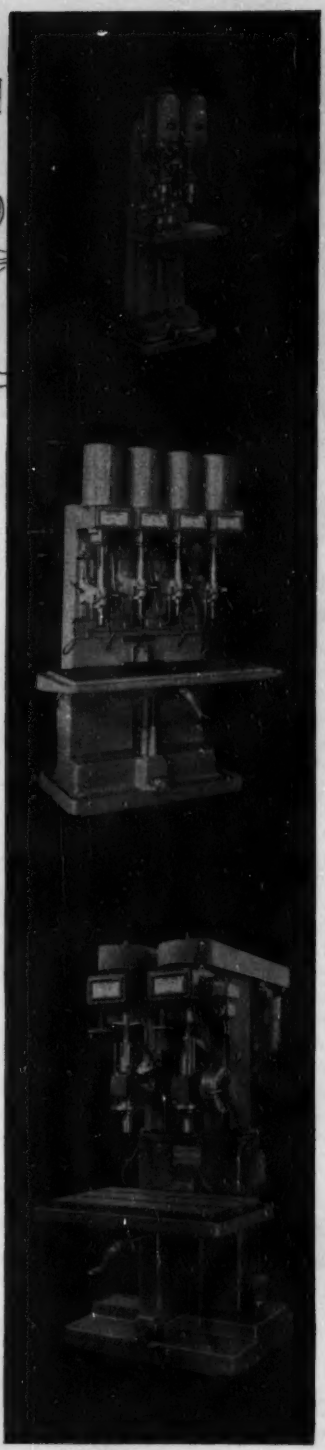
In addition Ultra-Chex serve as micrometer standards for mikes from 0 to 4 in. Optional is an optical parallel with 1¼-in. dia and ½ in. thick. Price of set is $22.50.

George Scherr Co, Inc, 200 Lafayette St, New York, NY



METALLOGRAPH has been redesigned to incorporate the following features: phase contrast for metallurgy; interference tester for surface finish; micro hardness tester; zirconium arc illumination; vibration isolator; and desk with built-in controls. Literature can be obtained from manufacturer — *William J. Hacker & Co, Inc, 82 Beaver St, New York*





NOW'S the time to plan for PROFIT...

with NEW Leland-Gifford Drilling Machines

Right now many of us have a breathing spell in the hurly-burly of production bottlenecks and backlogs. It's a great opportunity to get set for the stiff competition coming up — to beat the squeeze on profits already being felt.

Take a good look at the drilling machines which have been fighting your production battles for years. Then compare them with the new Leland-Gifford drilling machines.

With convenient central controls, fast speed changes, reduced work handling and many other advanced features, these modern drilling machines can boost production and accuracy to the point where profits are considerably widened and competition is not only met but bettered.

Your inquiries and orders will receive immediate, complete and personal attention. Deliveries can be made *promptly.*

Get in touch with the office nearest you or write for complete information.

LELAND-GIFFORD
Drilling Machines
WORCESTER 1, MASSACHUSETTS, U. S. A.

- **CHICAGO 45**
  2515 West Peterson Ave.
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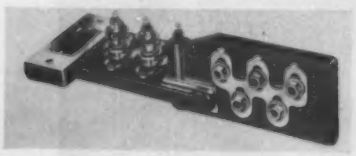
  75 South Orange Ave.
  South Orange, N. J.
- **LOS ANGELES OFFICE**
  2620 Leonis Blvd., Vernon 58, Cal.
- **INDIANAPOLIS 6**
  P. O. Box 1051
- **ROCHESTER 18**
  P. O. Box 67, Roselawn Station

Safety Clutch Is Two-Handed

Electronic two-handed safety clutch was designed for use on devices requiring single-trip or single-cycle control. Machines cannot be tripped except by simultaneous motion of both hands to send single electrical pulse to solenoid. Controls are located out of danger areas. Only finger touch is required and it is said that operators soon synchronize load, trip, and unload motions, into time-saving sequence.

Tele-Trol converts any mechanical clutch to electric solenoid actuation. Plug-in connections are furnished by which several variations are possible in operation. Accessories will convert mechanism into one hand, knee, or foot control as well as remote-operation.

Benchmaster Mfg Co, 1835 West Rosecrans Ave, Gardena, Calif



Wire Straightener Handles All Cross-Sections

Units straighten round or flat wire as well as wire with irregular cross-sections. Each consists of two sets of 5, 7, 9, or 11 grooved rolls set at right angles. Rolls can be grooved to exact diameter of wire or V-grooved to handle range of sizes.

Each roll can be individually adjusted by means of socket setscrew and is mounted on a hardened spindle set in ball bearings. Straighteners can be mounted on slide feeds, roll feeds, or hitch feeds to provide automatic unit for straightening and feeding wire.

Durant Tool Supply Co, 136 S Water St, Providence 3, RI

Weld-Bilt Steel Belt Conveyors

Steel belt conveyors in widths from 12 to 60 in., and any length from 10 ft up have been added to the Weld-Bilt line of materials handling equipment.

The 14-gage cold-finished steel sections, continuously hinged with ¼-in. bolt pins, move on ball bearing rollers and grease-sealed, hardened runways. Changes in belt lengths are easily made by addition or removal of links and bolted channel steel supporting structure units. The 5-ft-long drive section is equipped with a high-torque, gear-in-head motor with completely enclosed case; screw-design take-up maintains proper belt tension at idler section, also 5 ft long.

West Bend Equipment Corp, 335 Water St, West Bend, Wis

Dynamic Pressure Measuring Devices

For pressure measurement in fields of aerodynamics, hydronamics, pressure control, and ballistics, line of high-performance pressure pickups is reported to feature miniature size, high-frequency response, high sensitivity, and flush mounting of either threaded or flanged cases. A variety of diaphragm diameters from ¼ to 1 in. are available to handle pressure ranges as low as 0 to 1 psi, and as high as 0 to 3000 psi. Measurements are said to be accurate to better than 1% of full scale. Pickups can be used in temperatures from –65 to +350 F, and have cases of corrosion-resistant stainless steel.

Output of the pickups can be used directly to drive oscilloscopes or senstive galvanometers. Permanent pressure records can be made on recording oscillograph, with preamplifier used if increased signal level is required.

Dynamic Instrument Co, Inc, 28 Carleton St, Cambridge 42, Mass

Portable Drill Is Automatic

Self-contained drilling unit, Series 92A, Keller Airfeedrill, is entirely automatic in operation. It advances drills under accurately controlled conditions, retracts and shuts off at a touch of the control valve. It features a sensing-type advance that moves the drill quickly to work and shifts the preset drilling feed. When applied to skip drilling, drill returns to rapid advance after break-through.

Unit also provides automatic peck-drilling, which retracts drill as often as needed to clear the flutes during work on deep holes. Speed of air motor may be adjusted over wide range. Motor also rotates on return stroke. Can be furnished with either Jacobs chucks or Morse taper adapters.

Airfeedrills are available in three basic sizes and 14 models having speeds from 250 to 15,000 rpm and strokes from 2 to 7 in.

Keller Tool Co, Grand Haven, Mich

Metal Surface Cleaner

Metal surface cleaner for use at room temperature is identified as Klem K-A-T Cleaner. It is a combination of a special alkaline and efficacious emulsion cleaner and can be used for removing soil from both ferrous and non-ferrous metals.

Formula is adapted to use in hard water areas without formation of normal hard water precipitates. Maximum corrosion resistance and minimum surface etching are claimed for the product.

Principal advantage is said to be that it eliminates need for heat coils in tank. It is particularly adapted to the smaller shop or department where cleaning is not a regular production process.

Klem Chemicals, Inc, 14401 Lanson, Dearborn, Mich

HY-PRO SPECIALIZES TAP TESTING

...to cut your production costs!

Hy-Pro concentrates its operation on producing one line—taps. Every step in their production from design to shipping receives the full attention of Hy-Pro's specialists. Every tap is made under these severe standards of Hy-Pro quality, and each tap is individually tested and checked before sending it on to your production line. Hy-Pro's leadership in tap advancement and consistent quality has helped win its reputation as "the tap specialists."

Let this specialized production help cut your costs. Contact your local distributor or call Hy-Pro direct. They offer you a full line of high quality taps backed by the experience of specialized engineering.

REG. U.S. PAT. OFF.

HY-PRO

HY-PRO TOOL CO., NEW BEDFORD, MASS., U. S. A.

ADDITIONAL WAREHOUSES:

6046 College Ave.
OAKLAND 18, CALIF.
Piedmont 5-4337

10428 W. McNichols Rd.
DETROIT 21, MICH.
University 4-1077

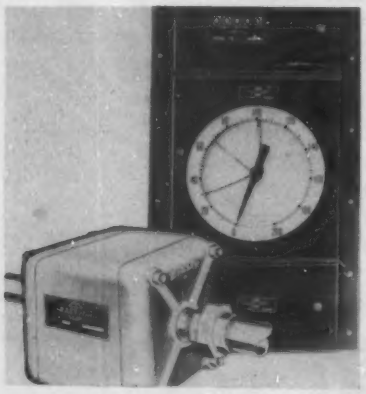
6141 North Elston Ave.
CHICAGO, ILL.
Newcastle 1-6486

Powered Roller Conveyor For Varied Shapes, Weights

Rapistan LR live roller conveyor is designed primarily for long-distance horizontal handling of materials that may vary widely in shape, size, and weight. Articles can be stopped at any point for inspection, labeling, weighing, or similar operations without interfering with flow of goods at any other point.

Unit is made up of 10-ft sections that can be combined to give lengths up to 150 ft. Length can be adjusted at any time by adding or removing sections of frame and belt; eight frame widths are available from 15 up to 39 in. Standard roller speed is 80 fpm; speeds from 60 to 200 fpm can be furnished.

Rapids-Standard Co, Dept LR, 342 Rapistan Bldg, Grand Rapids 2, Mich



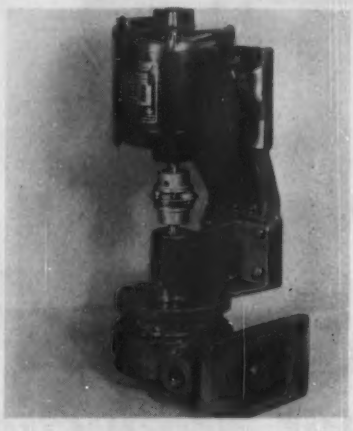
Bowser Xactronic Flow Meter

Xactronic electro-magnetic flow meter, identified as Figure 950, permits measurement of a great variety of conducting liquids. High pressures and temperatures, or a high concentration of suspended matter present no obstacle.

Simple, compact metering element consists of an enclosed-magnet, stainless steel tube with teflon liner and attached electrodes connected to the indicator or recorder, remotely installed at any desired location. Limit of accuracy is rated at 1% of the full-scale reading; under appropriate conditions an accuracy of ½% can be obtained. Accuracy is unaffected by changes in liquid viscosity, density, temperature, or by transition from laminar to turbulent flow, as well as by fluctuations of line voltage. Instrument scale is linear.

Meter is available in six sizes ranging from ½ to 2 in. High flow rates are possible with no restriction of rate of flow. Capacity is limited only by pipe size.

Bowser, Inc, 1365 E Creighton Ave, Fort Wayne, Ind



Centrifugal Pumps Are Redesigned by Pioneer

Pioneer seal-type centrifugal pumps featuring optional third outlet back through the intake port are adaptable to both continuous and intermittent operations, handling most liquids not too viscous or corrosive for modern corrosion-resistant alloys. Redesigned models are part of line of seven different models which permit conformity with JIC standards.

Both improved models are designed for flange mounting on outer surface of tank. Positive prime is reportedly assured with reduced height of liquid in supply tank. Conventional right or left discharge outlets are available.

Sizes in the line range from 1/20 to 5 hp. Larger sizes are rated up to 174 gpm at free flow and 36 gpm at 115 feet of head. It is stated that the neoprene and carbon-disk seal never needs adjustment and rarely needs maintenance or replacement. Impellers are forward-curved-blade type designed to increase fluid velocity gradually.

Pioneer Pump Div, Detroit Harvester Co, 14300 Tierman Ave, Detroit 38

Device Adds 14 in. Extra Lift To Spacemaster Fork Truck

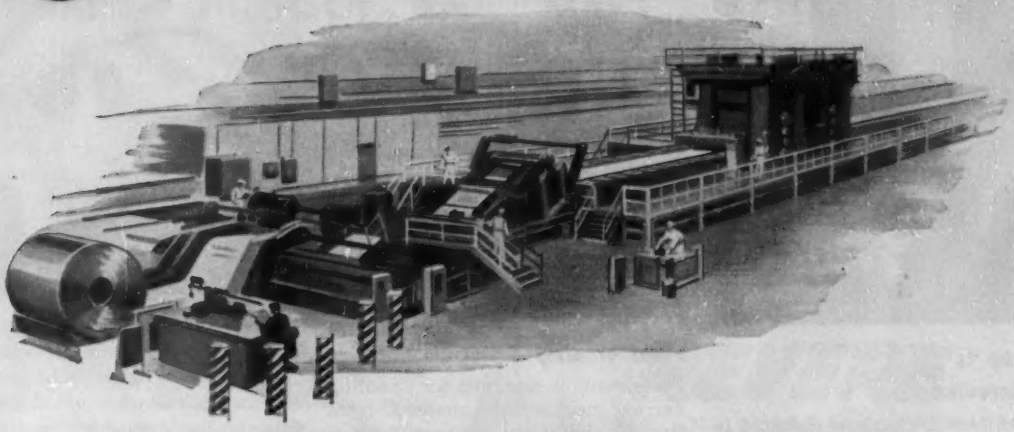
Lewis-Shepard compound carriage, developed for use with Spacemaster electric fork trucks, adds 14-in. extra lift with no increase in collapsed height of the vehicle. Where collapsed height is 83 in., usual fork elevation is 127 in. With this device, forks can be elevated to a height of 141 in.; capacity remains approximately the same, with only a 3-in. extension of load center.

Unit consists of an extra short mast section, welded to the normal lifting carriage, and an extra carriage containing the forks which rides within the new mast section on rollers. Center ram first lifts extra carriage and fork to top of new mast section, then it and outboard rams continue to rise.

Lewis-Shepard Products, Dept R-41, Watertown, Mass

AIR GAGE inspects six critical dimensions on engine piston; dimensions are checked automatically while piston is in air ring. Assembly consists of chrome- plated air ring with two sets of gaging cartridges for checking skirt diameter at top and bottom, including 0.001-in. taper, two air spindles each with six air jets for determining average diameter of pin bore and two air-snaps for measuring height between centerline of pin bores and top of dome
The Sheffield Corp, Dayton 1, Ohio

A rolling mill that rolls on a cloud...



ALEMITE OIL-MIST

Pampers and protects vital bearings on this Wallingford Steel Company rolling mill with tiny, air-borne particles of oil—Saves $480 a month in coolant alone—Far more in labor, time, maintenance and lubricant!

When a rolling mill, such as this, squeezes steel sheets to size as readily as you squeeze toothpaste from a tube, bearings must stand a fearsome strain and pressure. Sometimes they don't stand it—run hot—and suddenly a $3500 bearing is nothing but scrap metal.

To avoid these dangers, protect these vital and costly bearings, the Wallingford Steel Company selected Alemite Oil-Mist. And now management is walking on air! Lubrication time is cut 83%, lubricant—to a mere fraction. Life of soluble oil rolling coolant is extended, saving $480 a month! Plus a saving of 24,000 gallons of pre-heated water, formerly used in replacing coolant.

Even more important, bearing temperatures immediately dropped as airborne particles of oil lubricated and cooled them at the same time. Product spoilage due to pitting from excess lubricant was halted. Even the housekeeping problems encountered under the old system disappeared! Overall savings are incalculable.

Here's the unit that brings these savings to *any* machine!

Alemite Oil-Mist is a completely automatic, completely enclosed system which atomizes oil into mist. Distributes it through tubes to bearings, where it is applied in a continuous, uniform film that lubricates and cools at the same time.

***Three types* of bearing fittings allow the use of Oil-Mist on any bearing—any machine:**

1. Oil-Mist fittings bring the most efficient lubrication in the world to roller, ball, needle—or any anti-friction type of bearing.

2. Oil-Mist spray fittings are recommended for open and enclosed gears and chains. Allow for concentrated application where it is needed.

3. Oil-Mist condensing fittings are applied to plain bearings, slides, ways, vees, cams, and rollers. Completely condense Oil-Mist.

FREE—the complete story on Alemite Oil-Mist and how it can bring these savings to any machine. Specifications, typical installations, case histories. Use coupon below.

ALEMITE Division of Stewart-Warner, Dept. C-64
1850 Diversey Parkway, Chicago 14, Illinois

Gentlemen: Please send me complete information on Alemite Oil-Mist. No obligation, of course.

Name _____

Company _____

Address _____

City _____ Zone ____ State _____

ALEMITE

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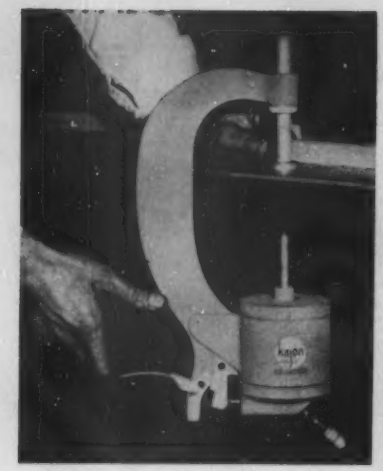
Ask Anyone in Industry

A PRODUCT OF SW STEWART-WARNER

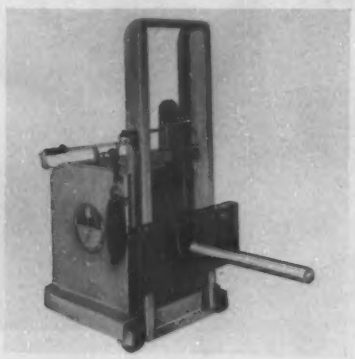


C-Clamp Is Air Actuated

Air actuated C-clamp is reported to increase production 25% or more on bench and tool work. Standard clamp has opening of 6 in. with 3-in. throat, and 2-in. plunger travel closing to shut position with 700-lb thrust on line pressure of 100 lb.

Air chamber and valve are integral part of clamp at base, where turn screw and handle would be on regular C-Clamp. Self-adjusting head provides even pressure and assures less chance of marring work. Clamp is rugged in construction with machined castings and heavy steel plate.

The Burklyn Co, 3429 Glendale Blvd, Los Angeles, Calif



Lightweight, Versatile Truck

Lightweight, manually operated hydraulic fork lift truck, called the Counterweighter, is available for handling practically every type of solid. Unit eliminates front straddles, providing unobstructed approach to any load, and is said to have the lightest counterweight ever applied to a 1000-lb lift truck.

Because of its weight it can be used in limited floor capacity areas; can be transported in elevators of extremely limited capacity. Model is equipped with adjustable forks; ram attachment for lifting cylindrical items is readily interchanged, and a special roll handling attachment is also available.

Big Joe Mfg Co, 900 W Jackson Blvd, Chicago 7, Ill

Portable Table Handles Sheet or Strip Material

Portelvator is designed for handling narrow sheet or strip material from storage, and at and between a series of machine operations.

Top table surface, which has a 14-in. adjustment between 24 and 38 in. above floor level, is 26 in. wide and 72 in. long. Drop leaves increase length to 108 in. Table capacity is 5000 lb; weight is easily moved from low to high position through standard Portelvator principle of power transmission. Four-point support of load eliminates possibility of tipping on ramps or uneven floors. Two 12½-in wheels and four 6-in. casters are mounted to provide shortest possible turning radius, and easiest possible positioning; 30-in. retractable tongue is hitch for towing.

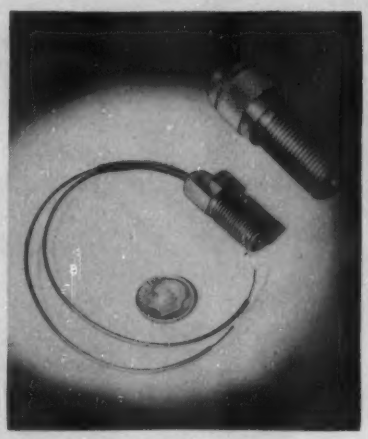
The Hamilton Tool Co, 830 S Ninth St, Hamilton, Ohio

Recording System Logs 48 to 144 Points

Recording system is capable of continuously logging conditions found in multiples of 48 to 144 points at the rate of 1 point every 1 to 5 sec. System was especially designed for testing and research applications where a record of all measurements is required. It has single set point and includes strip chart recording instrument, junction box, and up to three switch units. Each switch assembly controls two banks of thermocouple points. Also incorporated is an alarm signal unit.

The multipoint logger may be stopped on any one point and utilized as an indicator. There are two types in the system—24 volt dc and 115 volt ac.

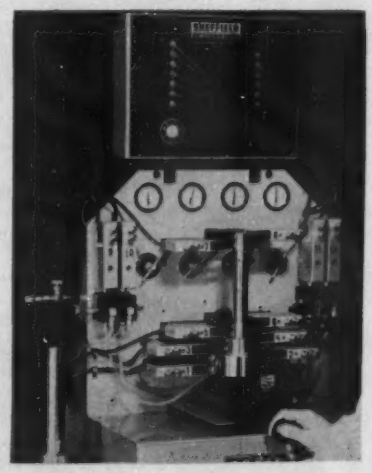
Industrial Div, Minneapolis-Honeywell Regulator Co, 4494 Wayne Ave, Philadelphia 44, Pa



Magnetic Pick-Up Is Miniature Size

Electro Products has added a miniature magnetic pick-up to its line. Designated Model 3015, unit generates electrical voltage when excited by steel or iron moving into magnetic field. Device may be used to indicate mechanical or electrical counting, linear or angular position, rate of travel, sequence timing, vibration, frequency, angular or linear speed, or other functions. It produces an ac voltage proportional to the speed of the moving metal object in its field. No mechanical contact with exciting metal is necessary.

Electro Products Laboratories, Inc, 4501 N Ravenswood Ave, Chicago 40, Ill



SHEFFIELD GAGE inspects 13 dimensions simultaneously on rear planetary carrier assembly and indicates by colored lights whether dimensions are within tolerance, oversize, or undersize. Ports inspected at rate of 600 to 800 per hour. Instrument is set up with maximum and minimum masters — *The Sheffield Corp, Dayton 1, Ohio*

PERHAPS YOU, TOO, CAN MAKE A BETTER PRODUCT WITH REVERE EXTRUDED SHAPES

This new Oxy-Acetylene welding torch is notable for the use of Revere Extruded Shapes in free-cutting brass—and also for its light weight, good balance, and easy handling. The connection for the gas tubes is machined from a shape, and silver-brazed to the fluted handle, also a shape, which is in turn brazed to a shape that contains the needle valve controls. Another fluted shape is the mixer, and the same shape is also the source of the next part, which is a second mixer. Another shape forms the nut which attaches the nozzle to the assembly. The nozzle, by the way, is made of Revere Free-Cutting Copper Rod, which is upset, drilled, swaged to size, and then chrome plated. The manufacturer of this new torch came to Revere to learn about the possibilities of extruded shapes.

If you have a product whose design includes a part or parts calling for extensive machining along the longitudinal axis, such as flutings, curves, recesses, remember Revere Extruded Shapes. They can greatly reduce machining time, lessen scrap, lower production costs, and speed up output. See the nearest Revere Sales Office.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

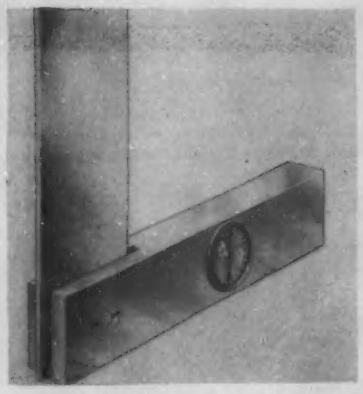
230 Park Avenue, New York 17, N. Y.

• • •

Mills: Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y. Sales Offices in Principal Cities, Distributors Everywhere.

SEE "MEET THE PRESS" ON NBC TELEVISION, SUNDAYS

New Model 30 Aircraft Welding Torch, made by National Welding Equipment Co., 218 Fremont St., San Francisco 5, Calif. The multiple mixer design is patented. Weight, 8½ oz. with medium nozzle. Made almost entirely from Revere Metals in extruded shapes and rod.

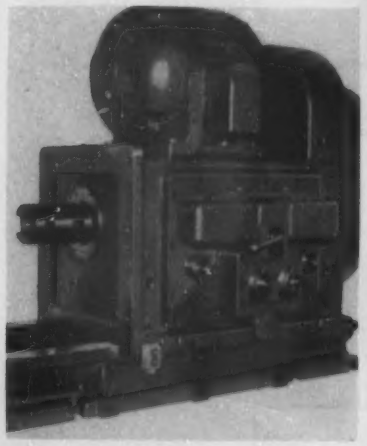


Acru Dial Square Reads Error Directly

Acru dial square is a high-precision instrument for testing angles between finished plane surfaces, enabling error to be read directly in thousandths of an inch per foot. Errors up to 0.030 in. per ft can be read.

Glass-hard blade of square is pivotally mounted in stock, relative to which it is angularly movable. Means for indicating a true right angle is also provided. For purpose of resetting, a master square is provided which consists of casting with only the base precision ground and two tungsten-tipped screw heads set to give exact 90° angle.

Imported by Morris Abrahams, Inc, 90 Hudson St, New York 13, NY



Hydraulic Feed Unit Has Interchangeable Head

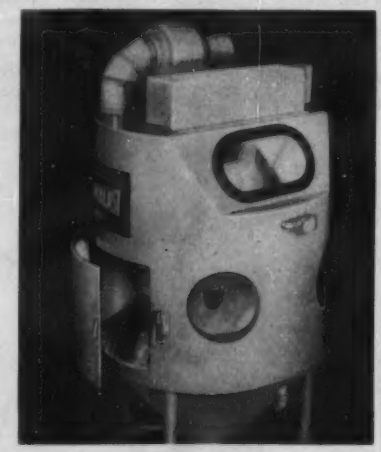
Hoefer hydraulic units may be mounted on any machine bed or column at any angle and removable heads interchanged if desired. Removable power pack panel slides entirely out of unit to permit fast inspection and adjustment.

Panel, valves, and pump are standard Vickers equipment. Hydraulic feed is valve controlled and infinitely variable within range of unit, starting from ½ ipm. Dwell may be used in automatic cycle by installing timer relay to control return stroke. Timer relay is extra equipment.

When drive motor is started it operates hydraulic pump and unit cycles automatically through rapid approach feed, rapid return, and shut off. Strokes are adjustable up to 18-in. max.

Hardened and ground taper spindle is mounted in Timken taper roller bearings. Spindle drive is through pick-off gears from main drive motor. Range of speeds possible with pick-off gears depends on drive motor used. 1200 rpm motors, 70 to 1400 rpm; 900 rpm motors, 52 to 1050 rpm.

Hoefer Mfg Co, Inc, Dept T, Freeport, Ill



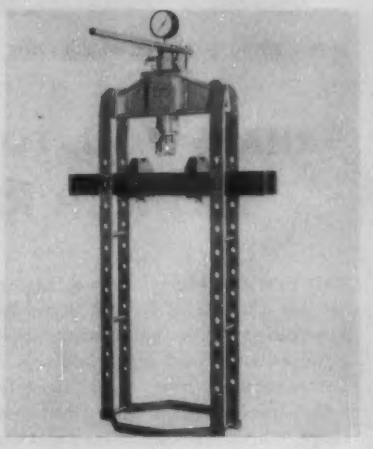
Cleaning Equipment For Small Shops

Jet Blast bench model units for metal cleaning are said to operate with the same efficiency in removing rust, scale, and foreign deposits from dies, molds, tools and other precision articles as does larger machine.

Jet Blast employs use of fine abrasive particles suspended in liquid. Liquid slurry is picked up by siphon injection and propelled to blast proportions by means of high velocity air stream. There are no moving parts in contact with the abrasive. Blast of wet abrasive imparts fine cleaning and polishing action.

Bench Model is 24 in. in diameter, 43 in. high, and weighs 155 lb. One or two blast guns may be used with 28 to 42 cu ft of air per minute at pressure of 85 to 100 psi. Liquid capacity is two gallons and the abrasive capacity is 13 lb.

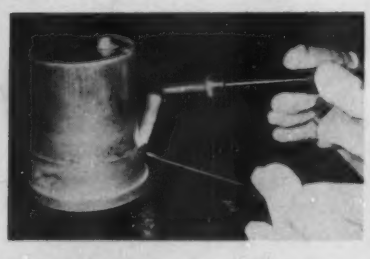
R W Renton and Co, 877 Addison Road, Cleveland 3, Ohio



Straightening Presses Have Checking Device

Hydropress line of straightening presses was designed to fill the requirements of every straightening job, including bars, rods, and armature shafts. To straighten, work is placed on the vee blocks, ram is brought to the work, where dial indicator registers amount of runout. Ram travel can be kept to minimum by easy adjustment. Checking pressure gage and dial indicator for runout results in fast, accurate work.

Arthur J Hurt and Co, 360 S Navajo St, Denver, Colo

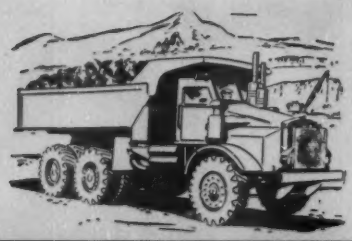


Heliweld Holder

Lightweight water-cooled Heliweld holder is for welding thin gages of aluminum, stainless steel, copper-base alloys, magnesium, and killed steel. Known as Airco H12A, tool's insulation material is constructed of tough plastic. Other features include interchangeable electrode caps in 2-, 3- and 7-in. lengths; assortment of ceramic nozzles designed to prevent arc shorting in tight spots; 12-foot length water-cooled cable assembly; four sizes of collets to accommodate 0.020, 0.040, 1/16 and 3/32-in. diameter tungsten electrodes; and gas-tight sealing rings at vital points.

Holder is rated at 125 amp and can be operated on ac or dc. It measures 7½ in. in length and weighs 4 oz.

Air Reduction Sales Co, 60 E 42nd St, New York 17, NY



Better Cuts Make Better Fits for Road Machinery Builder

This rugged machine is in service two shifts — 16 hours a day — five days a week shearing parts of various thicknesses and shapes for heavy earth-moving equipment. It is rated for mild steel 12' x 1".

THE ease with which good, square, accurate cuts are obtained has made the Steelweld Shear of a road machinery manufacturer very popular with the operators and shop management.

Experienced with various type shears, they know the importance of easy knife clearance adjustment. They know that the best cuts are obtained when the correct clearance is provided for each thickness of plate being cut. As they point out, improper knife clearance on any shear often results in a heavy plate being cut at an angle with respect to the thickness, or light gauge metal burring.

Adjusting knife clearance on Steelweld Shears is such an easy, quickly-performed task that operators take care of it automatically. Turning a hand crank until a gauge pointer is on the proper metal-thickness figure is all that is necessary — a task done in a matter of seconds.

The big time saving made on knife changing as compared with most shears is another factor greatly appreciated. Easily done in two hours on a Steelweld, this job frequently requires all day on other machines.

Steelweld's unusual pivoted-blade operating principle makes possible outstanding cost-cutting advantages. For the complete story, send for the catalog below.

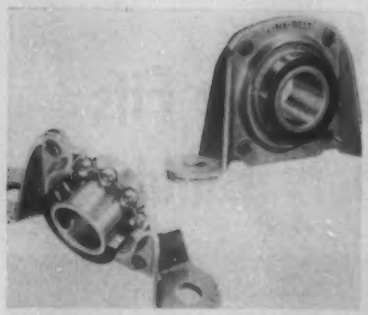
GET THIS BOOK!

CATALOG No. 2011 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.

1440 EAST 282nd ST. *WICKLIFFE, OHIO*

STEELWELD PIVOTED BLADE SHEARS



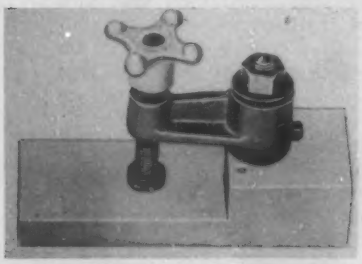
Pillow Blocks for Light Loads

Ball-bearing pillow blocks with pressed-steel housings are designed for applications where speeds are relatively low and loads are light. Combining strength, and light weight, housings reportedly permit cost reduction.

Precision deep-groove single-row ball-bearing, self-aligning in all directions, is said to assure smooth operation and long life. Long inner ring distributes load evenly over large shaft area.

Blocks are available for shafts from ⅝ to 1¼ in. in dia. They are installed by slipping inner ring onto shaft and locking it into position. Slotted bolt holes permit easy lateral adjustment. Synthetic rubber lip-type seal, integral with bearing, provides seal. Additional information is contained in manufacturer's folder No. 2517.

Link-Belt Co, 307 N Michigan Ave, Chicago 1, Ill



Reversible Clamp Assembly

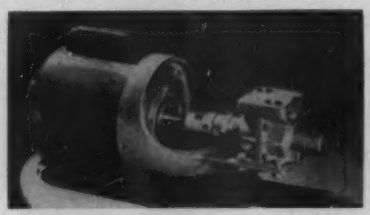
Jergens Tool has announced a reversible clamp assembly for use in holding down work to be drilled or milled. It is designed to operate with either left- or right-hand swing by optional location of stock. Assembly is made of malleable casting tumbled smooth and is designed to quickly swing clear of work and fixture. Made in three sizes, assembly can be simply applied by drilling and tapping one hole.

Jergens Tool Specialty Co, 712 East 163rd St, Cleveland, Ohio

Universal Live Center

Extreme accuracy and load-carrying capacity are claimed for this live center. Known as the Ideal Universal, it was designed to meet production demands for closer tolerances. Eccentricity tolerances are limited to ±0.0001 in. through use of twin precision-type roller bearings preloaded after assembly. Point is then ground in its own bearings after being inserted into live center. Double seal is incorporated and stationary Hycar sealing ring in anodized aluminum cap keeps out dirt. Grease is kept within center by slinger rotating with point. Housing and working parts are hardened and ground to provide durability. Center is available with Morse tapers from two to five for rotating speeds from 50 to 2000 rpm and maximum loads to 5200 lb.

Ideal Industries, Inc, 1057 Park Ave, Sycamore, Ill



Pump Motor Unit

Eco Engineering announces compact pump-motor unit for direct motor drive of its PP-2 series of pumps. Bracket to suit new NEMA frame standards requires no outboard support or special alignment. Pump shown is positive-displacement type with two opposed, axially oscillating impellers equivalent to duplex piston action, providing continuous non-surge flow. Pressures are to 150 psi, capacity 10 gpm.

Eco Engineering Co, 12 New York Ave, Newark 1, NJ

ELECTRI-CAR is being produced in three models for plant operation. Scooter model provides space for necessary maintenance tools. The Lugger, 1000-lb capacity, can be used for transporting small equipment, tools, and trays. The Courier is a single seat model for use by foremen and superintendents — *Victor Adding Machine Co, 3900 N Rockwell St, Chicago 18, Ill*

Case Hardening Method for Steel Gears, Sprockets

A new method of case hardening gear and sprocket teeth at the same time they are being machined, and which permits close control over depth as well as area of hardening, is reported by Cogmatic Co. Process employs combination of flame preheat, flame machining of toothed form, and quenching—in one automatic operation. Specially developed quenching methods are said to make it possible to localize hardening to portions of teeth having greatest wear, while leaving other areas tough and less susceptible to breakage. By pre-heating ahead of cutting flame, Cogmatic process reportedly increases depth of case hardening to at least 3/16 in. Pre-heat is accomplished by auxiliary torches.

Cogmatic Co, 1330 N Franklin Place, Milwaukee, Wis

Robbins Vise Jaw Protector Plates

Set of aluminum plates convert a regular bench vise into vise for highly finished metal parts. Plates attach easily to vise jaws and are held in place by tempered spring clamps. Soft workpieces may be clamped directly and held firmly without damage. There are no setscrews or bolts. Gripping surfaces are kept smooth with ordinary sandpaper. Plates are available in four vise jaw lengths of 2½, 3, 3½, and 4 in. for $1.50 per set.

Robbins Mfg Co, Dept A, 1240 S Prairie Ave, Hawthorne, Calif

PLUS...

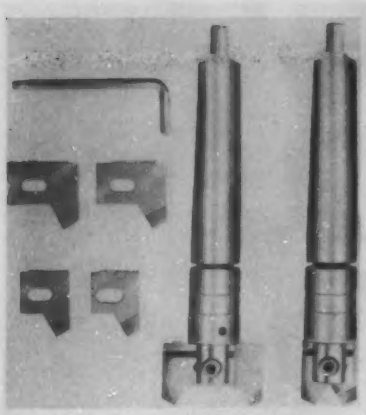
THESE 10 STERLING ADVANCED DESIGN FEATURES

- Over 50% less inactive space
- Protected construction
- Greater bearing protection
- Advanced design terminal box
- Heavy duty ball bearings
- Herringbone rotor
- Direct-through ventilation
- Increased efficiency and performance
- Stator windings of advanced design
- Improved insulation

WRITE FOR NEW BULLETIN NO. F-410-A

STERLING ELECTRIC MOTORS

New York City 51; Chicago 35; Los Angeles 22; Hamilton, Ont., Canada; Santiago, Chile



Hayden Adjustable Drill Now in Smaller Size

A smaller size 1- to 2-in. adjustable drill has been developed by Hayden to supplement its 2- to 4-in. adjustable drill. With two sets of blades the new drill can cut from 1- to 1½-in. and 1½- to 2-in.-dia holes.

Illustration shows blades and wrench. A scroll ring engaging the bottom sides of blades performs double functions of adjusting blades and supporting them against thrust of cut. Body of drill is made of heat-treated alloy steel; blades are made of HSS or carbide-tipped HSS.

It is reported that the drill finds its greatest value when used on drill-presses and radials where its balanced cut works ideally with normal spindle construction. It can be used on such relatively inexpensive machines to relieve load on jig borers or horizontal boring mills. Blades are easily modified to produce such finishes as round corners, flat bottoms, and angular surfaces, and steps.

Hayden Twist Drill Co, 8626 Lyndon St, Detroit 38, Mich

Stamping Calculator

Bao's stamping calculator may be used to determine specifications for small and medium size stampings.

With a single setting, for instance, calculator will indicate: blank diameters of cylindrical shells; number of drawing operations needed for producing the shell, as well as diameter and height in successive draws; bending allowances for any stock thickness, inside bending radius, and any bending angle; developed punch radius for over-form; weight of any kind of material needed for making the stampings.

Vinylite calculator measures 4 x 10 in.; instruction sheet provided.

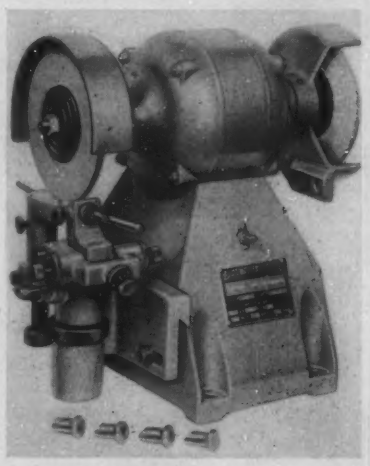
Bao Slide Co, PO Box 7902, Chicago 80, Ill

Fairfield Micro-Height Gage

Fairfield Gauge Co has improved its Micro-Height gage. A 3-in. hardened, ground, and lapped standard riser is now available for attachment. With direct capacities from 0 at base to 3 in., in thousandths, addition of riser extends range to 6 in. Outside surfaces are finished in tarnish- and rust-proof satin chrome for durability.

Gage reads exactly like a micrometer. By replacing the scriber, which is supplied, with a dial indicator, instrument can be used to measure distances between holes or surfaces, permitting fast, accurate inspection.

Distributed by The Cleveland Instrument Co, 735 Carnegie Ave, Cleveland, Ohio



Drill Grinder Made by Union Twist Drill

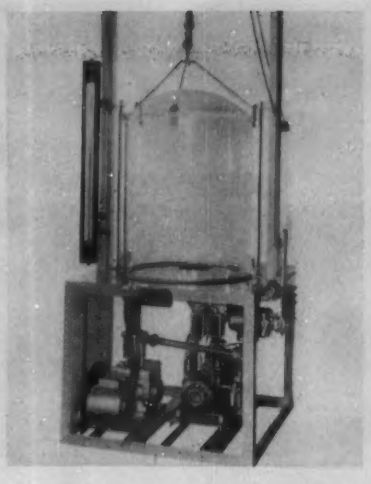
Crankshaft-drill-point grinder being used at Union Twist Drill plant and now available to the trade is reported to provide a fast accurate method of grinding crankshaft points on drills ranging in size from No. 1 to No. 50, A through U, and 3/64 through ⅜ in.

Drill is rocked into wheel to grind one notch, returned, indexed 180°, and operation repeated for other notch. Adjustable diamond truing device trues wheel with one motion. Tilting fixture is adjustable for any sharpening angle and flute guiding drill bushings can be furnished for each diameter of drill needed.

The motorized spindle is precision ground with preloaded ball bearings and mounts a 6-in. grinding wheel at one end and a 6-in. general utility wheel at the other. Motor is ¼ hp, 3450 rpm, fully enclosed.

Further information is contained in manufacturer's bulletin designated Form Number 1011.

Union Twist Drill Co. Athol. Mass



Vacuum Chamber Designed for Complete View of Test Specimen

Vacuum chamber has been developed to permit observation of complete unit being tested at all times.

Jar, enclosing a working space 24 in. high and 24 in. in diameter, cannot be raised unless controls are in the "dive" position. Power hoist facilitates raising and lowering. Unit, capable of altitudes up to 100,000 ft, has a simulated rate of climb of 32,000 fpm up to 60,000 ft.

Standard equipment includes safety devices, manometer, electrical terminals, and access penetrations in baseplate.

American Research Corp, 11 Brook St, Bristol, Conn

Robertshaw-Fulton Recorder-Controllers

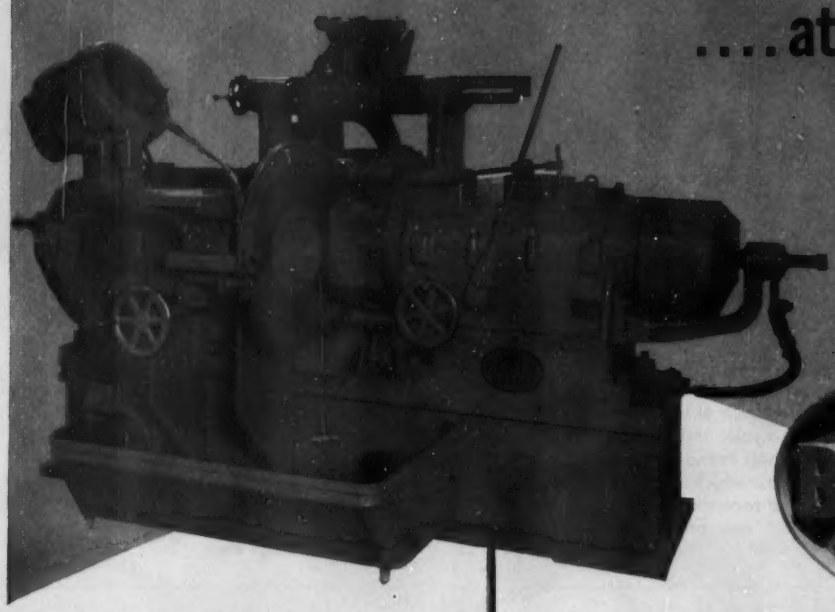
Line of recorder-controller instruments have applications including recording and control of temperature, conductivity, strain, force, position, pressure, and telemetering. Low cost and excellent flexibility are reportedly made possible by the simplified unit assembly principle. Recorder is composed of four interchangeable units. Instruments operate on no-balance principle using ac signal.

Example of simplification is the bridge components contained in single interchangeable unit. Available with up to 4 inputs. A range of nickel, tungsten, and platinum resistance temperature detectors is available, covering temperatures of −200 C to +500 C. All except the platinum bulbs feature linearized chart scales.

Field & Instrument Div, Robertshaw-Fulton Controls Co, 2920 North 4th Street, Philadelphia 33, Pa

ACCURACY HELD Within .0002"

for ① SIZE ② FLATNESS ③ PARALLELISM



....at 750 Pieces Per Hour

with this

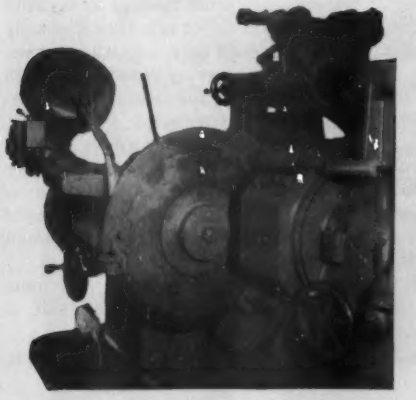
BESLY

No. 226 Double Spindle Wet Disc GRINDER

High speed steel pump vanes which are used in the hydraulic pump of an automotive power steering unit are finish ground with this precision grinder . . . and at a rate of 750 pieces or 1500 surfaces an hour. Precision at production rates can be yours, too, because Besly Double Spindle Wet Disc Grinders can be easily adapted to grind many other parallel surfaced parts. Write for full information.

AUTOMATIC FEEDING Gives Precision at Production Rates

Hydraulic pump vanes are automatically hopper fed into a constantly rotating feed wheel, which has a series of openings to receive parts. As the feed wheel revolves, the pump vanes are carried between the parallel faces of the abrasive discs where two sides of the vanes are simultaneously ground. After grinding, the parts are automatically unloaded into a discharge pan.

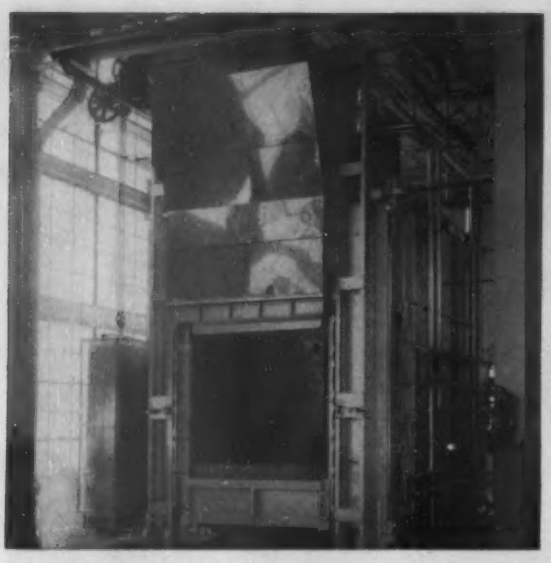


BESLY

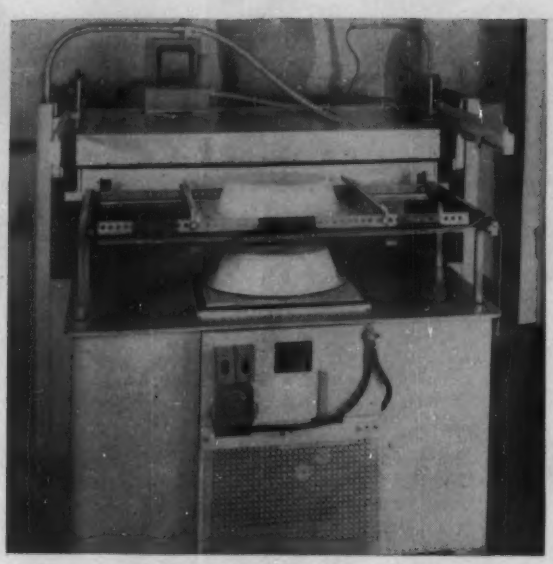
BESLY-WELLES
CORPORATION

Established as Charles H. Besly & Company in 1875
120 Dearborn Ave., Beloit, Wisconsin

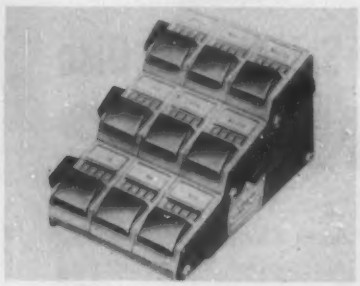
BESLY GRINDERS AND ACCESSORIES • BESLY TAPS, DRILLS, REAMERS • BESLY-TITAN ABRASIVE WHEELS



HEAT-TREATING temperature ranges from 1275 to 2200 F in this Rockwell installation which called for heating and recirculating features not ordinarily included in narrower-range furnaces. It was built for annealing and stress-relieving castings and other ferrous pieces with work limit of 50,000 lb. It is single-end car-type with door operated by endless chain manual-type lift rig. Low-pressure natural gas burners fire from both side walls above and below the charge. An insulated 1600 F fan is located on structural supports on top of furnace. For cooling cycle, insulated duct is equipped with fresh air inlet damper. Furnace car is reinforced steel structure on eight wheels which run in roller-type flange bearings. Indicating and recording controllers with motor-driven program unit are provided
—W S Rockwell Co, 200 Eliot St, Fairfield, Conn



VACUUM FORMING can reportedly be done on this Auto-Vac by inexperienced help. These drape vacuum forming machines are completely automatic, made in various sizes, and are completely enclosed. An actual product can be used as test mold; illustrated is a piece of Styrene Co-Polymer 080 gage placed on clamping frame and ordinary enamel wash basin on platen. No special tooling is necessary. Frame is lowered automatically, then heating cycle softens sheet which is instantaneously pulled over basin and vacuum forms the hot sheet to the basin contours. Seconds later the vacuum is released—jet of air is blown between basin and plastic, releasing the formed plastic from the "mold." Frame automatically rises and is opened to remove the basin.
—Auto-Vac Co, 2116 Post Rd, Fairfield, Conn

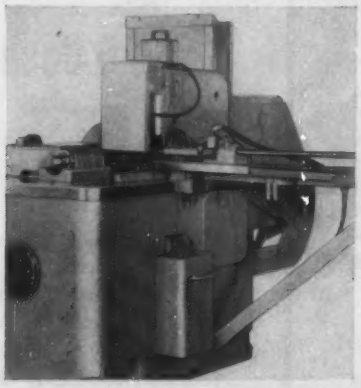


Multiple-Unit Reset Counter

Vary-Tally counter is available in any of 66 combinations, up to six banks high and 12 units wide, with a minimum of two units wide, arranged compactly on stands in tiers.

Fingertip pressure on front lever of a unit registers each count from one to 9999. Reset knob returns all counters in any tier to zero instantly with one complete turn of the reset shaft. Name, color, denomination, quality, size of item to be counted, is inserted in panel over reading line.

Veeder-Root, Inc, Hartford 2, Conn



Grieder Tube Cutoff Machine Makes 6000 Cuts per hr

Machine employs two special true blades, one horizontal, one vertical, to cut tubing to 2-in. dia and of any ordinary wall-thickness and shape. Operation is fully automatic with feed rate of 600 fpm. Cutting speed is regulated by gear ratio to max of 6000 cuts per hr. Every cut is reported to be accurate in length within 0.002 in.

Precision clamping dies prevent distortion of tube and reduce burr to minimum. Also incorporated is an air-operated combination clutch and brake unit. Minimum length of cut is 1 in.

Grieder Industries, Inc, 309 Richardson Bldg, Toledo 4, Ohio

New Pyrometer Ranges

Automatic Simplytrol pyrometer is an on-and-off control for furnaces, ovens, and other equipment where temperature must be held by turning heat off and on. It is a thermocouple millivoltmeter with adjustable contacts and load relay rated 5 amp 125 v ac non-inductive. Higher load ratings can be furnished as optional. Auto-Limit switch permits use of Symplytrol to hold temperature or for shut-off when temperature is reached. In limit position, it might be a safety warning or shut down device.

Latest listing includes ten new ranges, bringing total to eighteen, to cover from –400 to +300 F.

Assembly Products, Inc, PO Box 191, Chagrin Falls, Ohio

FOR APPEARANCE AND PERFORMANCE

SQUARE D's NEW REVERSING DRUM SWITCH

DESIGN LEADERSHIP FEATURES

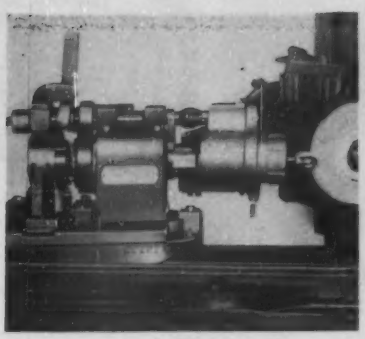
Compact Size • Large Screw type Terminals • Replaceable Terminal Blocks • Convertible from Maintained Position to Spring Return • Positive Shock-proof Indexing • Single Captive Cover Screw • Generous Wiring Space • Two ½" Conduit Openings at Bottom • Front or Rear Handle Operation • Large and Legible Nameplate • Modern Streamlined Styling

This Class 2601 Reversing Drum Switch is a "natural" wherever the direction of rotation of a small motor is to be manually controlled. It can be used with single phase, polyphase and D. C. motors.

Bulletin 2601-A gives complete details
Write Square D Company,
4041 N. Richards St., Milwaukee 12, Wis.

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY



Grinding Attachment Has Positive Control

Model 500 circularity grinding attachment is reported to be faster, easier to handle, and to feature greater adaptability than previous models. The motor-driven circularity grinding attachment simultaneously revolves the work to be ground and moves it longitudinally back and forth. This simultaneous operation is the result of direct gear drive from drive shaft to collet housing gear and spacer gear.

Standard spacer gears, with a follower pin for each flute to be ground, provide indexing for 2, 3, 4, 6, 8, or 12 flutes. Special spacer gears can be provided when number of flutes are other than those listed. The number of back and forth movements per revolution of work is controlled by number of follower pins used in spacer gear.

Simple, speedy setups on this accurate attachment are reported to permit fast and easy grinding of form relief, radial relief, form and radial relief together, tapered cylindrical, and straight cylindrical.

Cutting tool to be produced or reworked is held in collet or between dead centers and revolves on its own axial center. Where full length of spiral cutting tools is to be ground for both form and radial relief, travel is similar to an OD grinder.

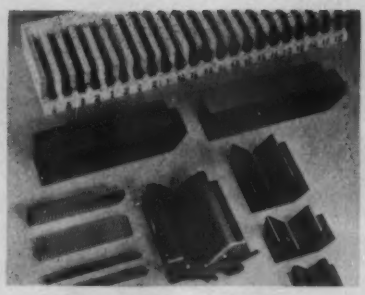
Detroit Reamer & Tool Co, 2830 E Seven Mile Rd, Detroit, Mich

Silver-Brazing Flux

All-State No. 110 brazaloy silver-brazing flux has high wetting action, protects metals up to 1800F, dissolves oxides, and meets government specifications.

The product is applicable to stainless steel, nickel, monel, copper, beryllium-copper, brass, bronze, steel, and silver. Material is high-quality substance of higher price than other items from same company.

All-State Welding Alloys Co, 249 Ferris Ave, White Plains, N Y



Magnetic Adjustable V-Block Has Variety of Applications

Anton magnetic adjustable V-block is calibrated to read to five minutes; hairline adjustment mechanism permits quick and accurate setting of vernier scale.

Self-contained setup can be removed from grinder for priority work and returned with no consequent loss of time in resetting. Device can be used in production as a holding fixture for quality work; can also be used as a sine plate, and is said to be particularly suited for layout work. Unit is made of alternating material with high permeability, low residual magnetism, and non-magnetic brass strips. Because laminations are held without pins, rivets, or any other holding device, they are guaranteed not to shift.

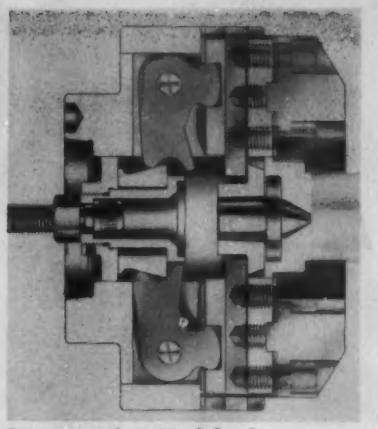
Anton Machine Works, 1226 Flushing Ave, Brooklyn, NY

Skid-Turner Cuts Handling Costs

Southworth skid-turner handles stock up to and including 52 x 76 in. in size, and 5000 lb in weight. Entire skid is turned in slightly under three minutes with a one-man operation using pushbutton controls.

Special design and construction assure minimum of squeeze to hold material in place and eliminate chance of damage from pressure on material being turned. Operator is in full control of skid at all times.

Southworth Machine Co, Portland, Maine



Compensating Model of S-P Power Chuck

Compensating model chucks are intended to hold rough forgings, out-of-round castings, or finished pieces with irregular gripping surfaces, and at the same time provide a maximum amount of equal gripping pressure on each jaw.

Work is positioned between centers and as power is applied to draw screw, cam on spool engages the levers and moves jaws toward work. Since work is out-of-round, one jaw makes contact first, stopping movement of mating lever. This lever moves spool laterally as spool continues to move to rear, closing other levers to continue closing second jaw until it makes contact. Cam and levers then force jaws to grip work securely.

Body of chuck is one-piece steel casting or special aluminum forging. All working parts are made of heat-treated alloy steels, precision finished to close tolerances. Spring-loaded centers are available on request.

S-P compensating chucks are manufactured in American Standard and serrated models, two-jaw and three-jaw and eight, ten, and 12-inch sizes.

The S-P Corp, 12415 Euclid Ave, Cleveland 6, Ohio

Micrometer Drilling Control For Small-Hole Machine

Hamilton Tool offers as an extra feature for its small-hole drilling machines, a micrometer drilling control for the positive location of holes in small parts. The device will locate one hole, or a series of holes.

Machine illustrated has capacity of 0.004 to 0.3125 in. Clearance from center of chuck to column is 5 in. and from base to chuck is 10 in. Spindle speeds range from 750 to 8750 rpm.

The Hamilton Tool Co, Hamilton, Ohio

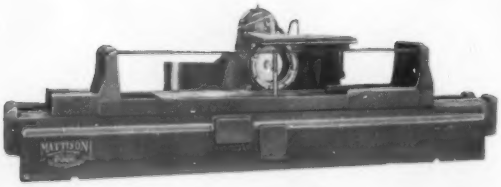
"Yep, Biggest Stock in Town!"

That's what most GREENFIELD Distributors can boast when you ask about threading tools and gages. In fact, chances are that a GREENFIELD Distributor is *The Cutting Tool Center* in your trading area. His knowledge of local demand and of suppliers, his stocks on hand, his ability to give service, all are yours when you buy through a distributor.

Greenfield TAP AND DIE CORPORATION, GREENFIELD, MASSACHUSETTS

Buy taps from DISTRIBUTORS ··· from GREENFIELD DISTRIBUTORS

Grinding matching surfaces of connecting rods on Mattison 4000 Face Grinder at Caterpillar Tractor Co.



Matching surfaces of connecting rods are accurately ground on a high productive basis on the Mattison No. 4000 Face Grinder. A special hydraulically operated fixture holds rod and cap in position.

Mattison Face Grinders will handle a wide range of work and are profitably used in virtually all industries — metal working, railroad shops, paper and pulp mills, terra cotta and rubber plants, steel mills and foundries. Ask us for free copy of bulletin 846-2RM for further information on our complete line of Face Grinders.

MATTISON MACHINE WORKS

ROCKFORD · ILLINOIS

FINANCIAL AID TO HIGHER EDUCATION

What Business Can Do to Help Our Colleges and Universities

Is the financial squeeze now gripping our colleges and universities grave enough to warrant direct action by the business community? If so, what can business do about it? This editorial is addressed to these two questions.

In the previous editorial in this series of two, it was demonstrated that **our colleges and universities, and particularly the independent institutions, face financial difficulties, which, unless relieved, promise to get progressively worse and might ultimately result in a national disaster.** This state of affairs obviously gives the business community a crucial stake in helping to relieve the plight of these institutions. For our business organizations can be no stronger than the total community of which they are a part.

It does not follow automatically, however, that every business firm should give direct financial aid to education. Already the business structure is heavily burdened with activities unrelated to its main purpose. These include acting as tax collector for more than $65 billion of federal, state and local taxes in the year 1953. There is a limit to the amount of such public enterprise that can be loaded on the business system.

Business Holds Key to Answer

If, however, the survival of a key part of our educational system depends on its having financial help from the business community, that help should be provided. And this is the situation of our independent privately endowed colleges and universities.

Of course, our tax-supported institutions of higher learning must also be kept strong, financially and otherwise. But they have recourse to public support not available to the independent institutions. Largely on this account, their present financial difficulties are much less acute than those of the independent colleges and universities.

These independent institutions have seen price inflation eat away much of the value of their endowments. Moreover, there is no prospect that these endowments can be sufficiently replenished by gifts from the wealthy people who provided them in earlier years. Progressive income and estate taxes have seen to that. Thus, they are faced not only with a peculiarly acute financial problem, but also one which cannot be solved except by tapping other sources of aid.

Tax Support No Solution

It is conceivable that the independent colleges and universities might solve their financial problem by seeking support from tax revenues. If they did this, however, they would lose their distinctive character as independent institutions, and our system of higher education would lose one of its major elements of strength. That is the existence in our educational system of both independently financed and tax-supported colleges and universities. Each has its special contribution to make to a well-balanced system of higher education.

What Business Can Do to Help Our Colleges and Universities

Business is directly dependent upon higher education to staff its increasingly complex and exacting operations. A key part in this process is played by the small, independent liberal arts colleges which are the hardest hit financially of all our institutions of higher learning. "These," states the Council for Financial Aid to Education recently formed by a group of business leaders, "have contributed a high proportion of the intellectual, scientific and religious, as well as business leadership of the nation. They have given much to the teaching of values and the practice of freedom. They are a vital bulwark to our system of free enterprise."

Means of Providing Help

There are many means by which business firms can extend help to our colleges and universities. The most obvious, of course, is to make outright grants of money either to individual institutions or to groups of institutions for such uses as the institutions think best.

Another means of help, increasingly employed by business firms, is to establish scholarships to pay the full cost of college or university courses of study. Sometimes the scholarships are open for general competition; sometimes they are limited to employees and children of employees of the firm granting them. Not infrequently those winning the scholarships spend their summer vacations working in the plants granting the scholarships.

Many companies have recently provided for what have come to be called "scholarships." These companies pay a flat sum to a college or university for every one of its graduates they employ. Financing of university research programs also offers a broad avenue for financial aid to our universities by business.

Need Two-Way Communication

Successful business philanthopic operations involve a knowledge of how to give money to make it do the most good. But they also require a knowledge of the problems with which they have very little experience. Not the least of these is how to make business a dependable source of financial aid to education, since business has no assurance of a profit on the dollars invested from one year to the next.

Considerations such as these emphasize the wisdom of [illegible] colleges [illegible] aid [illegible] business, in making the first of its ten conclusions that "better communication, by direct contact, is needed between industry and the colleges to understand their problems and to lay the foundation for the creation of mutual understanding is much more important than the raising of some money and letting it go at that. The problem of aid to education by business has its immediate urgency, but there is also a long-range program to be developed on which business and the colleges and universities must pull together in the years ahead to find a satisfactory solution.

As stated at the outset, failure to find a satisfactory solution could result in a national disaster. This means that **to give proper heed to their own future prosperity and the future welfare of the nation, business firms generally must go to work on the problem of financial aid to higher education. They must go to work first, to understand the problem; second, to establish two-way communication with our colleges and universities about it; and third, to develop a program which pays proper heed to the needs and capabilities of both business and higher education.**

This message is one of a series prepared by the Financial Research Department of Economics to help [illegible] public knowledge and understanding of important nationwide developments that are of particular concern to the business and professional community served by our industrial and technical publications.

Permission is freely extended to newspapers, groups or individuals to quote or reprint all or parts of the text.

Lucile O'Meara

Typical application for Atlantic cutting oils, showing a Barber-Colman milling machine.

NEW ATLANTIC cutting oils

for high production on tough jobs

Here at last is really effective help in keeping production high in your milling, turning, and drilling departments.

With these new Atlantic non-soluble cutting oils, you can maintain high production rates without the handicap of foul odors on hot tough jobs. Work is visible right through the oil. And the oils are compatible when blended—even down to the heaviest grades. Operators like these new oils better too, because they don't indelibly stain hands or clothing.

Get complete information on these new oils and your copy of the Atlantic Cutting Oil Selection Chart. Learn about this superior measure for cutting oil efficiency . . . determined by performance rather than chemical composition. Write your nearby Atlantic office listed below, or The Atlantic Refining Company, 260 South Broad St., Philadelphia 1, Pa.

ATLANTIC

LUBRICANTS · WAXES
PROCESS PRODUCTS

PROVIDENCE, R. I.
430 Hospital Trust Bldg.

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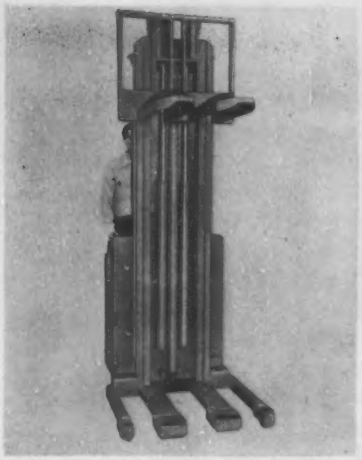
1112 South Boulevard



Fork Truck for Narrow Aisles

Narrow-aisle electric fork truck is a modified straddle unit with four base legs: 5 x 2-in. load wheels straddle the pallet while the 7-in.-wide elevating forks lower over another set of base legs with dual 5 x 2-in. wheels. Arrangement provides for maximum stability at elevated heights up to 158 in., and insures against excessive wheel and floor wear.

Unit can right-angle-stack pallet loads from 6-ft-wide aisles. For use with skids, open-face, or 4-way entry block pallet where high lifts are required; block design can be handled also on all four sides by a hand pallet lift truck.

Raymond Corp, 47-120 Madison St, Greene, NY

Automatic Selector Inspects Spur and Helical Gears

Automatic gear selector segregates 100% of gears produced into three categories: satisfactory, oversize, and undersize. According to the manufacturer it can be coupled to inspect any spur or helical gear at a faster rate than it can be produced on any of the following machines: shaving and hobbing units; gear shapers; shear-speed gear shapers; any other gear tooth cutting or finishing machine.

Operator feeds gears into selector, or gears can be inspected in a fully automatic setup without operator attention. Unit can be furnished with an automatic shut-off, coupled with a counter, to stop production machine if any number of consecutive gears (optional number) are rejected, or percentage of rejects on a given run exceeds set limits. Automatic shut-off can be incorporated either into a production line with full automation, or one in which operator feeds gears manually. Stopping the machine guarantees that minimum number of rejects will be produced before machine or cutting tool is checked and put back into operating condition.

Two accurate master gears, one of which is motor-driven, are used to check gears being produced. Units being checked are passed between motor-driven fixed master gear and a second pivoted master gear, which moves in or out as required to stay in contact with gear being checked. If movement is within prescribed limits, gear (after inspection) rolls down an incline and is deposited in a tote pan or conveyor to be transported to the next operation. If it is over- or undersize, it is diverted by closing of a mechanically operated baffle to its proper rejected classification exit at bottom of selector.

Michigan Tool Co, 7171 E McNichols Rd, Detroit 12, Mich

Electronic Timer Provides Delayed Shut-Off or Start

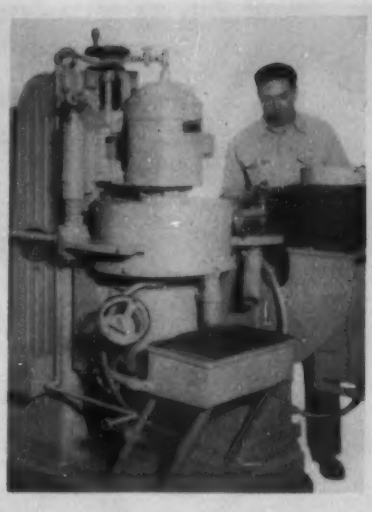
Tele-Trol electronic timer, originally developed as a time delay shut-off for Benchmaster Koil Kradles, is now available for application to a wide variety of mechanical and electrical equipment.

Unit is continuously variable from 0 to 10 seconds and immediately recycles when triggered. Since it is of the accumulative type, re-cycle time is added to balance of previous cycle if triggering occurs before shut-off is reached.

Device handles a 30-amp non-inductive load at 125 v ac; operates on 110-v single phase, but models are available for 220 or 440-v 3-phase operation. Over-all size is approximately 3x4x5 in.

Furnishes accurate means of delaying shut-off or start on all types of units, such as work-feeding devices and equipment using electrical motor drives.

Benchmaster Mfg Co, 1835 W Rosecrans Ave, Gardena, Calif



Double Vertical Spindle Grinder

Oil pump eccentric rings are ground at rate of 1200 to 1400 per hour on this Besly 905-18-in. double vertical spindle grinder. Except for loading and emptying hoppers, operation is automatic.

Rings are hopper fed into rotating feed wheel which carries parts between two abrasive wheels. Both faces of rings are ground simultaneously with accuracy held to 0.002 in. for size and 0.0003 in. for flatness and parallelism. Safety mechanism has been incorporated to assure proper loading; should part fail to properly enter feed wheel, radially-mounted arm releases limit switch and breaks electrical circuit. Grinding is done wet with coolant conducted directly into grinding zone through upper motor spindle. Nonmagnetic coolant filter is used, although magnetic separators can be used.

Besly-Welles Corp, Beloit, Wis

Bench Top Work Surface

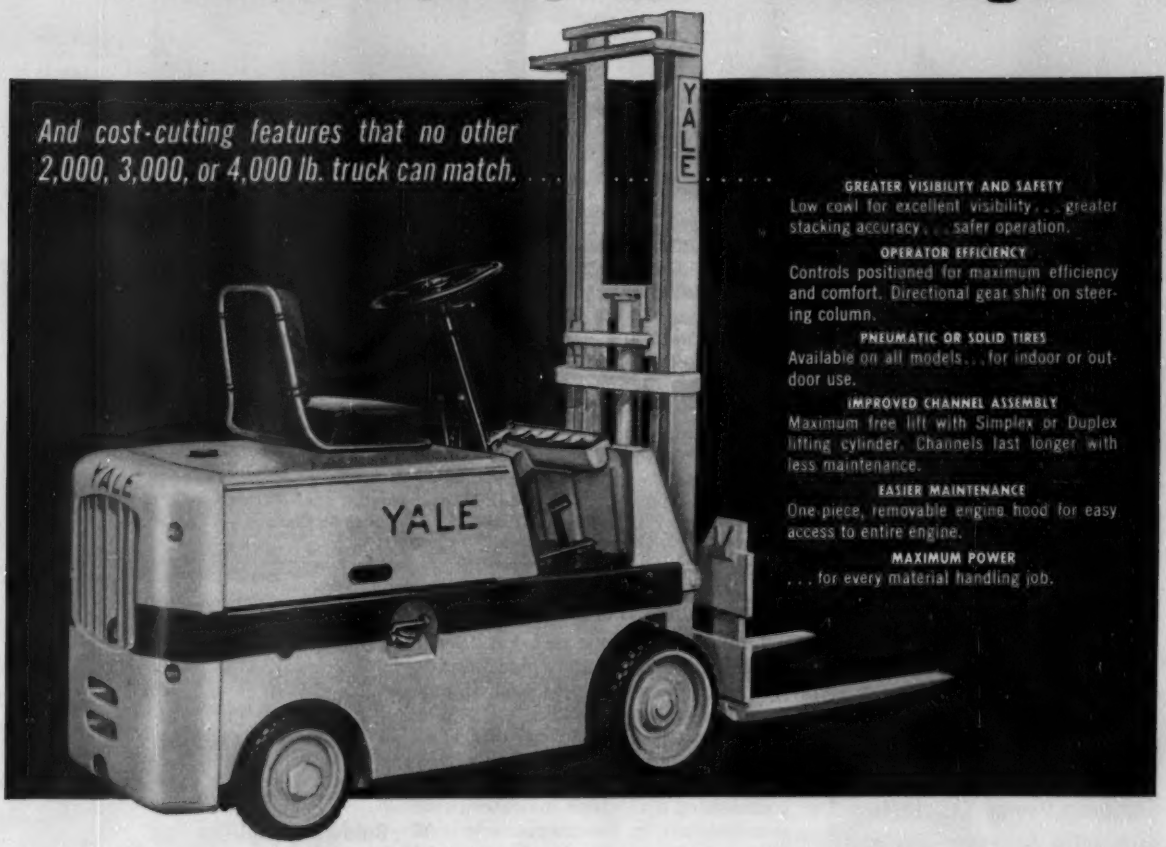
Work surface materials for bench tops are available as CrafTop, and ShopTop (heavy-duty thickness). Both are of laminated construction, with solid core of blocks faced on both sides with Resinwood to provide an extremely hard and durable surface. Said to be acid, oil, and grease-resistant, splinter-proof, and warp-free.

Available in standard thicknesses of 1½, 1¾, 2, and 2¼ in., and in widths of 24, 32, 36, 48 in. Lengths range from 24 to 96 in. in single units; any number of units can be joined into one large top.

Rock Island Millwork Co, Dept C-5, Rock Island, Ill

FIRST 2,000 LB. GAS TRUCK WITH YALE FLUID COUPLING

. . . in this capacity and over-all length


And cost-cutting features that no other 2,000, 3,000, or 4,000 lb. truck can match. . . .
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YALE
GREATER VISIBILITY AND SAFETY
Low cowl for excellent visibility . . . greater stacking accuracy . . . safer operation.
OPERATOR EFFICIENCY
Controls positioned for maximum efficiency and comfort. Directional gear shift on steering column.
PNEUMATIC OR SOLID TIRES
Available on all models . . . for indoor or outdoor use.
IMPROVED CHANNEL ASSEMBLY
Maximum free lift with Simplex or Duplex lifting cylinder. Channels last longer with less maintenance.
EASIER MAINTENANCE
One-piece, removable engine hood for easy access to entire engine.
MAXIMUM POWER
. . . for every material handling job.

All the proven economy and durability of YALE Fluid Coupling are now available in a short, lightweight Truck. This latest YALE Truck, in capacities from 2,000 to 4,000 lbs., has exclusive, cost-cutting features . . . can't be beat for all-around handling speed, safety and efficiency. And you can put it to work without delay . . . without major investment . . . under the exclusive YALE "3-Way-Finance-Plan." Mail coupon for complete details.

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INDUSTRIAL LIFT TRUCKS AND HOISTS

*Reg. U. S. Pat. Off.

MAIL THIS COUPON TODAY

The YALE & TOWNE Mfg. Co., Dept. 186
11000 Roosevelt Blvd., Philadelphia 15, Pa.

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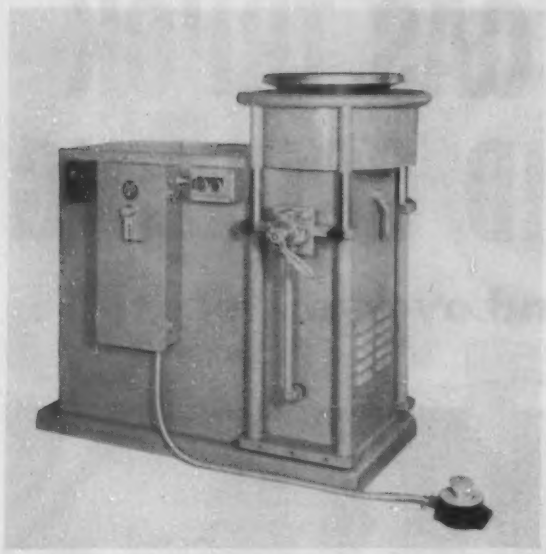


SPEED LATHE, vertical-spindle vacuum-type, permits easy loading of large or heavy work in vacuum holding fixture. Machine has over-all height of 35 in. Work is placed in fixture and by closing vacuum circuit hand valve, part will be centered and gripped. Spindle speeds range from 100 to 4800 rpm and are infinitely variable. Motor is coupled to spindle through Twin Disc clutch which eliminates time lag; disk-type brake provides fast stopping of spindle. Machine can be supplied with electrical interlock to stop it if vacuum circuit fails. Holding part by vacuum assures firm grip without marring work. Revolving part to be polished assures uniform finish — *Schauer Mfg Co, 4550 Alpine Ave, Cincinnati 36, Ohio*

WET TOOL GRINDER, 30-in. single wheel, has two-speed multiple V-belt drive from 5-hp motor to grinding spindle. Safety interlock prevents overspeeding of grinding wheel. Heavy spindle is accurately machined and ground to size. Ball bearings are fully protected. Large-size oil reservoir has visual gage. Wheel is protected by structural plate steel guard, adjustable for wheel wear, and plate steel wheel flanges. Positive shaft lock simplifies wheel changes. Splash pan supports 10-in.-square worktable which tilts 15° above and 30° below horizontal. Coolant system includes built-in reservoir and settling chamber, adjustable nozzle, and coolant control valve — *The Standard Electrical Tool Co, 2480 W Sixth St, Cincinnati 4, Ohio*

Ferguson Power "Y" Section Eliminates Conveyor-Line Jams

Compact, power-driven "Y" unit has been introduced to eliminate clogging and jam-ups on converging conveyor lines.

Consists of a 90° roller conveyor curve and a 5-ft-long, live, straight roller conveyor section, both of which are chain-driven by a single ½-hp gearhead motor through universal joints.

Unit, offering speeds up to 90 fpm, can be incorporated into all types of package lines, whether on the floor or suspended from the ceiling. Plastic guard on either side permits observation of moving parts and prevents clothes catching in chains and sprockets.

Harry J Ferguson Co, Jenkintown, Pa

Gas Volume Meter

Bennett gas volume meter has been designed to accurately and continuously measure the volume of any gas passed through it.

As gas is introduced, a set of rotors turns; movement is carried up through timing gears to the calibrated dial which indicates cubic centimeters in the large circle and liters in the small one. Accuracy of the pocket-size unit is reportedly within 5% between range of 5 to 65 liters flow rate per minute.

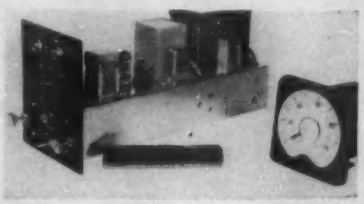
J J Monaghan Co, 500 Alcott St, Denver 4, Colo

Flex-Drill Works From Portable Tool

Three parts make up a drill extension for getting into close quarters: Flexible coupling can bend 90°, is 3 in. long and ¼ in. in dia; Extension rod is ¼-in. stock made to fit coupling; Handle acts as guide.

Unit has no maintenance requirements; takes drill chuck on 5/16-in.-24 thread at end of coupling.

The Ritmar Corp, 183 New York Ave, Huntington, N Y

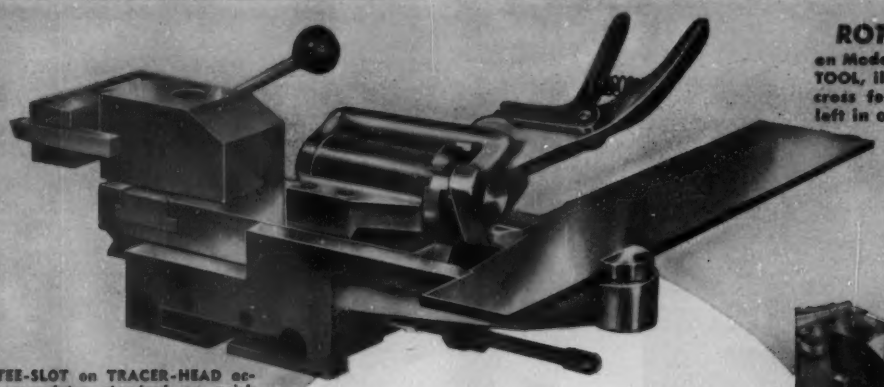


Baldwin Amplifier for SR-4 Load or Pressure Cells

Baldwin PTL amplifier will amplify electrical output of resistance wire strain gages in an SR-4 load or pressure cell so as to operate most commercial ac voltmeters having a 5-v scale. This scale may be graduated in any force or pressure unit, such as pounds or pound per square inch. Accuracy depends upon voltmeter used and is normally within 1 to 2%.

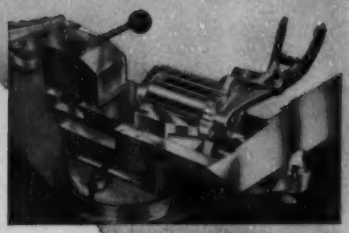
Instrument operates on 115-v, 60-c ac power through a built-in regulated power supply and incorporates a triode tube with a 3000-hr life expectancy. Panel mounting units, as shown, or single and multiple units in a case are available.

Baldwin-Lima-Hamilton Corp, Philadelphia 42, Pa



ROTARY STYLUS— on Model M-1500 Lehigh TRACER-TOOL, illustrated at left, permits cross feed screw to be set and left in one position while successive pieces are machined or cuts are made. Speeds production. Assures accuracy even on old worn lathes.

TEE-SLOT on TRACER-HEAD accommodates standard or quick change tool holders, square turrets, planer clapper box, grinding attachments, boring bars, etc.



O.D. CONTOUR TURNING
— and tapering. Unlimited radii.

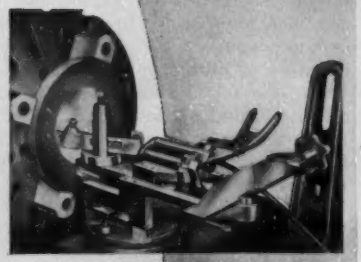
Faster—lower cost

LATHE DUPLICATING

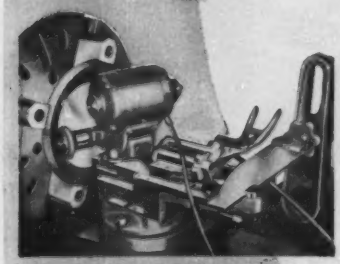
WITH *ANY* ENGINE OR TURRET LATHE

BULLARD OPERATIONS
— including outside and inside tracing. Tracer-head adapts to ram.

- No complicated electronic or hydraulic controls.
- Quickly set up without making permanent alterations to the lathe. Does not tie up costly capital equipment.
- Gives complete working visibility and chip clearance.
- Positive stylus contact assured by air pressure to tool through a 3-way valve and pressure regulator. Uses shop pressure.
- Horizontal slide on Tracer Head operates between pre-loaded ball bearings. Precision built.
- Uses easily made, low cost, hardened templates.
- Proved in hundreds of shops of all sizes and in scores of major manufacturing and service industries for short and production runs.



CONTOUR FACING
— or any engine or turret lathe.

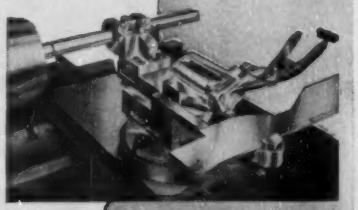


CONTOUR GRINDING
— including internal and external contours.

MODELS NOW AVAILABLE

EL-1100 *to fit lathes 9"-14"*.....Price $375
M-1500 *to fit lathes 16"-24"*.....Price $725
EL-2000 *to fit lathes 24" & larger*.....Price $975

Prices subject to change without notice • Tool holder and template not included • Air valve and regulator supplied only with Models M-1500 and EL-2000.



I.D. BORING
— consisting of various blended radii as well as 90° steps.

ENGINEERING SERVICE
Our engineering department will be glad to advise you on any duplicating problem. Catalog and engineering bulletins on request.

JUST OUT—New Catalog Lehigh SOLENOID VALVES For complete AUTOMATION mailed on request.

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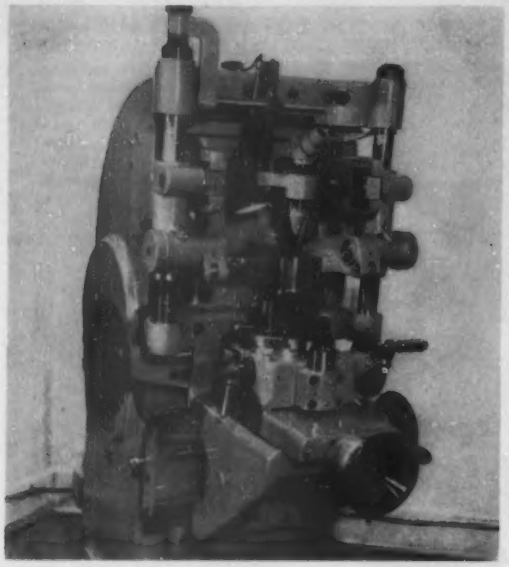
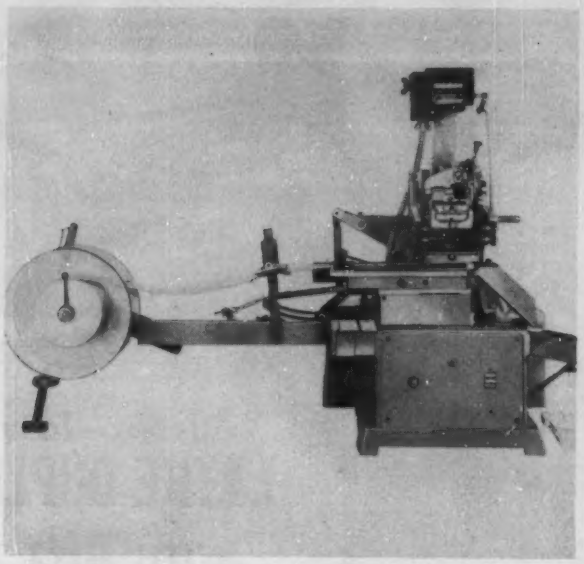
Lehigh
TRACER-TOOL®
PROFILE-TRACING LATHE ATTACHMENT

West Coast Distributor: CAMPBELL CONTOUR ATTACHMENT COMPANY, 1320 W. Esther St., Long Beach, Calif.

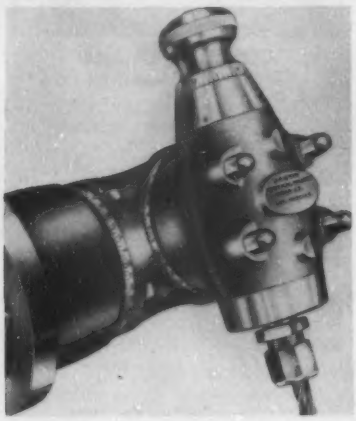
MFGRS. OF AIR VALVES • AIR CYLINDERS • AIR HOISTS • AIR MOTORS • PRECISION CASTINGS • AUTOMATIC VENDING MACHINES • COMMERCIAL REFRIGERATION SYSTEMS & UNITS



PUNCH FORMING AND SHAPING machine with slotting attachment is for preparation of cutting and punching tools, molds for plastics, and jigs for non-cutting production methods. It reportedly maintains a precision of profile and parallelism within 0.01 mm limits. Number of strokes per min is 33, 47, and 66 or 40, 57, and 81. Slotting motion max is 6 in. and min stroke, 2 in. Feed: roughing, 0.03 ips; finishing, from 0.002 ips—*Imported by Carl Hirschmann, 30 Park Ave, Manhasset, NY*



MARKING MACHINE, especially designed for printing notched tickets, tags, and labels in roll, fan-folded, or strip form, features positive feed mechanism to insure exact printing registration. Designated model 56A, it prints at rate of 80 to 100 per min and will either cut off and stack or rewind on roll. Maximum imprint area is 2 x 2½ in. Rolls up to 2¼-in. width and 3¾-in. length are automatically fed into machine. Machine is powered by ¼-hp gear-reduction motor and occupies bench space of 20 in. depth by 23 to 40 in. depending on size of paper roll—*Markhem Machine Co, Keene 40, NH*



Vertical Milling Head Has 4500-rpm Speed

Heavy-duty universal vertical milling attachment with lapped-in, heat-treated, spiral-bevel compound miter gears running in oil has stepped-up speed range increased to 4500 rpm with ball-bearing mounting throughout. Capacity of gear rating is 1½ to 15 hp.

For most makes and sizes of horizontal milling machines, boring mills, and planer machines, the heads are available in 32 sizes and models. Micrometer-vertical-spindle feed quill is optional on all models.

Milling head may be mounted in two plane positions on the horizontal milling machine. The cone-base-type head is bolted to the vertical column of the milling machine and operated with direct power take-off from front main spindle drive. Over-arm spindle-drive adapter-type head is mounted into over-arm bore and operated with direct power drive take-off from rear main spindle on milling machine table.

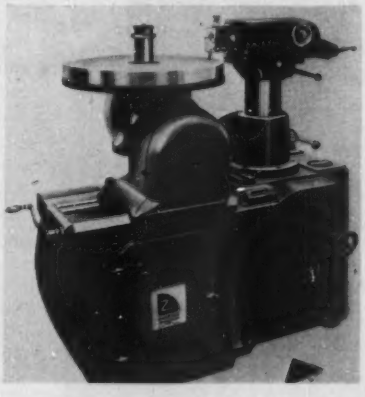
Brown Vertical Milling Head Co, 1615 Riverside Drive, Los Angeles 31, Calif

Mercury Electric Tractor

Model 550 Tug electric tractor is available in either twin-three or conventional four-wheel design. Both are offered in two drawbar capacities: standard model is rated at 2500-lb maximum pull; heavy-duty, 3000-lb pull.

Design features include: automobile wheel steering; unit-assembled double reduction drive; self-energizing hydraulic brakes; Timken duo-grip, seat-actuated mechanical parking brake; four-speed magnetic contactor travel control with adjustable timed acceleration and controlled plugging, and demountable wheel rim and tire assemblies.

Mercury Mfg Co, 4044 S Halsted St, Chicago 9, Ill



Dividing Machine Calibrates Three Kinds of Surfaces

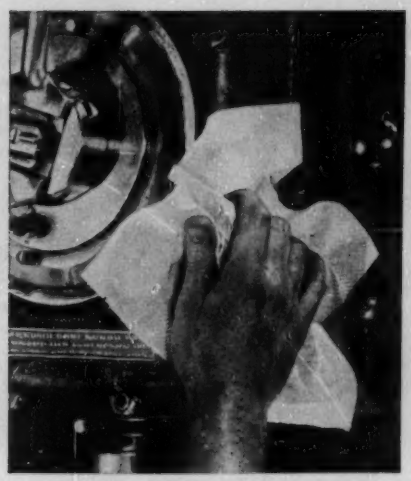
Dividing machine, designated Model Z-950, permits graduation of circular, cylinder, as well as linear verniers, scales, gages, on a single unit.

Circular surfaces up to 950 mm in diameter can be calibrated, cylinder surfaces up to 1400 mm; linear graduations up to 800 mm in length can be performed by mounting a separate dividing head on the machine.

Fully automatic unit is available in a production as well as in a high precision model.

William J Hacker & Co, Inc, 82 Beaver St, New York 5, NY

The Petroleum Industry . . . wants a good, all-purpose wiper that can be efficiently located in refineries and plants. Because Scott Wipers come in handy boxes, they make for easy one-way distribution and simpler control.



The Heavy Machinery Industry . . . calls for a rugged wiper. Scott Wipers are strong —they are two-ply. For even more strength, two or three can be bunched together.

For your men... for your machines

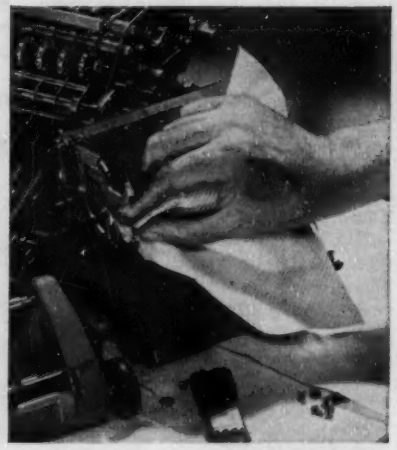
Designed to meet a human need, Scott Industrial Wipers bring a new standard of safety and efficiency to Industrial Wiping.

Many, many companies are now using Scott Industrial Wipers in their wiping operations.

Scott Wipers are appreciated by *all* employees—for their versatility, their cleanliness, their strength, their absorbency, and for their safety.

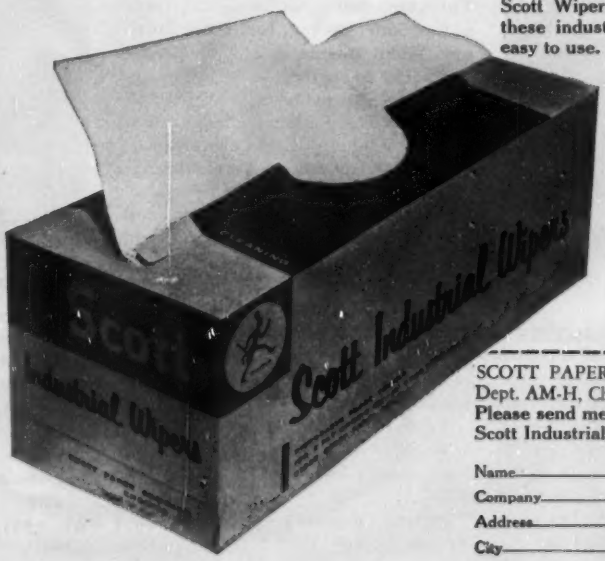
And with Scott Industrial Wipers you can budget the wiping operation in your plant.

A Scott specialist is at your service—to talk to you about this revolutionary product. Simply mail the coupon or get in touch with your local Scott distributor.



The Service and Utility Industries. In the powerhouse or the repairman's toolbox, Scott Wipers are proving themselves in these industries. They're easy to carry, easy to use.

The Hands of Production—your most important tools—are protected by disposable Scott Wipers. Harmful metal chips and filings are thrown away along with the used wiper.



Scott Industrial Wipers—another Scott product that is changing America's way of doing things.

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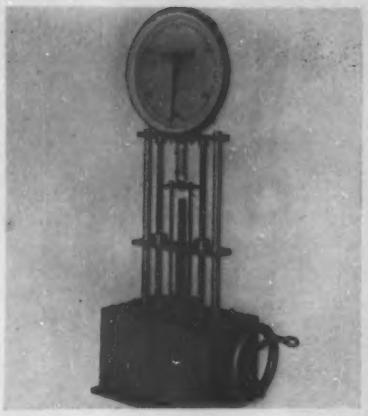


Redesigned Spring Tester

Medium-high capacity spring tester, Model No. 965, is built to test compression springs up to 4½ in. dia by 12 in. long, and extension springs 4½ in. dia by 10 in. long. Basic test stand can be supplied with interchangeable dynamometer scale heads in the following capacities: 10, 25, 50, 100, 200, 300, 500, and 600 lb. Minimum graduations for the above capacities respectively are: 0.05, 0.05, 0.1, 0.2, 0.5, 1.0, 1.0, and 1.0 lb. Heads conform in accuracy to US Bureau of Standards Table 7.

Tension and compression are applied to the springs by means of a handwheel. Tester is supplied with two input shafts for fast and slow application of load, and handwheel is easily shifted from one shaft to the other. Dimensions are 12 x 16 x 46 in.

John Chatillon & Sons, 85-93 Cliff St, New York 38, NY

Conveyor-Line Table Elevates and Revolves

Raymond Corp has designed a round top for its standard adjustable table so that it may be turned and elevated to serve several converging conveyor lines. Top revolves freely or can be locked in a single position. A 16-in. range of height is provided, allowing top to be fixed at any height between 28 and 44 in. Capacity is 2000 lb.

Table is portable, but can be held in position by a floor lock. Hydraulic elevation and lowering is controlled by convenient foot pedals on the pump mounted on base of table.

The Raymond Corp, 47-121 Madison St, Greene, NY

Multi-Purpose Push Broom

Lightweight push broom, designated Blade Sweep, has an optional metal scraper which fits on head clamp at right angles to the brush strip for removal of packed deposits, such as mud or grease.

Multi-position head clamp permits brush strip to be set in any of four positions for varied sweeping jobs. Heat and acid-resistant materials used in brush include synthetics, wire, and fibers, such as bassine and tampico. Softer fillers may be used for spreading paint evenly over large floor surfaces. Brush strips are available from 18 to 36 in.; special lengths and types of filler according to order.

Fuller Brush Co, Industrial Div, Hartford 2, Conn

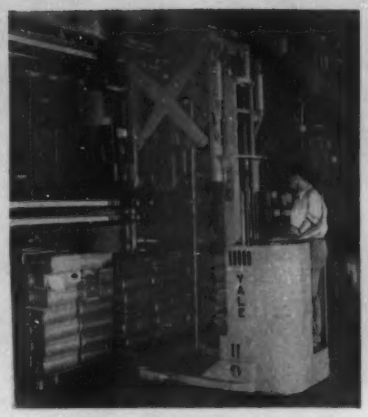
Magnetic Thickness Tester

Thickness tester, called Handi-Gage, is a production tool for metal finishers. When magnetic end is applied vertically to surface to be tested and slowly pulled away, a calibrated inner stem appears. Distance stem travels before magnet releases itself from surface is a measure of coating's thickness.

Tests electroplated cadmium, copper, brass, silver, zinc, tin, lead, nickel zinc-tin and lead-tin alloys on steel, as well as hot-dipped tin and zinc. It is said to be particularly useful for testing thickness of paint, plastic lamination, enamel, and lacquer coatings on steel. Tests from 0.0001 to 0.015 in.

Total weight in pocket-size case with extra magnets for various thickness ranges is less than 6 oz; price, $75.

Platers Research Corp, 59 East Fourth St, New York 3, NY



Yale Electric Fork Truck For Restricted-Space Duty

Warehouser Extend-A-Load electric fork truck operates easily in a 7-ft aisle and can pick up and deposit loads without straddling pallets or skids.

Unit has 2000-lb capacity at 24-in. load center. Said to be capable of extremely short radius turns, it can reach out and pick up or deposit a load at any height from floor level to 126 in. With fork spread adjustable from 12 to 26½ in., it can handle pallets and skids of various sizes and types. Loads are extended and retracted by a hydraulically powered pantograph device actuated by two double-acting cylinders operated by pushbutton control; operating controls are grouped for one-hand operation.

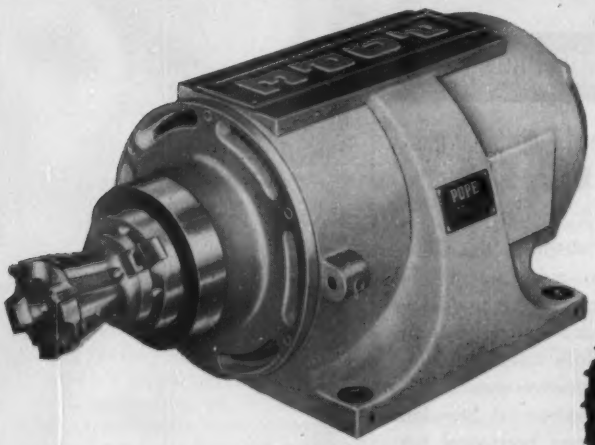
Yale & Towne Mfg Co, Materials Handling Div, Philadelphia, Pa

FLEXTEX ABRASIVE LINE consists of mounted points, straight wheels, depressed center disks, and cutoff wheels. All-purpose wheel roughs and finishes practically any material in one operation because of extreme strength and cushioning action which eliminates grinding marks. Said to be fast-cutting and self-dressing on deburring, polishing, weld-grinding, and general abrading of tough, difficult-to-grind metals — *Metal Removal Co, 1546 N Orleans, Chicago 10, Ill*

You Can Specify POPE HEAVY DUTY WHEEL HEAD SPINDLES With Confidence

POPE Spindles like these are designed for a wide variety of applications including grinding, boring, milling, drilling and many other operations requiring PRECISION COMBINED WITH RUGGEDNESS.

For continuous production and trouble-free operation
THERE'S NOTHING LIKE A POPE SPINDLE WITH ROLLER BEARINGS



◀ **P-2565 Heavy Duty, Totally Enclosed, Fan Cooled, Motorized Milling Spindle in sizes from 1 to 30 HP, 600 to 3600 RPM, 220-440 or 550 volts, 3 phase, 60 cycle (other electrical specifications available.)**

P-12007 Heavy Duty Belt Driven Milling ▶ Spindle, in sizes from 1 to 50 HP.

SEND US YOUR SPECIFICATIONS AND LET OUR ENGINEERS RECOMMEND THE SPINDLE FOR THE JOB YOU ARE GOING TO DO

No. 99

Specify **POPE** **PRECISION SPINDLES**

POPE MACHINERY CORPORATION
Established 1920
241 RIVER STREET • HAVERHILL, MASSACHUSETTS

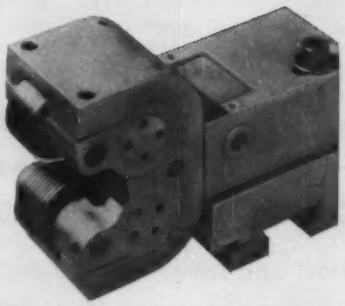
Facts about Thread Rolling

it will pay you to know

Thread Rolling . . . as a Primary Operation

with Reed Thread Rolling Attachments on Automatic Screw Machines

Reed Thread Rolling Attachments are currently built in four popular standard sizes and designed to operate in more than 300 cross-slide positions on over 100 sizes of automatic screw machines. Each size is adjustable to accommodate an infinite range of work diameters within its capacity and consists of two units . . . a head of compact rigid design assembled to an adapter by a floating swivel connection.



Thread Rolling . . . as a Secondary Operation

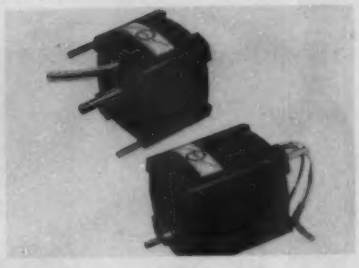
with Reed Cylindrical Die Thread Rolling Machines

Reed Cylindrical Die Thread Rolling Machines, using three dies, have made possible interchangeable manufacture of threads on component parts where close tolerances once made selective assembly a costly requirement. Standard vertical and horizontal machines provide for a wide variety of applications on various work diameter capacities up to 4 inches.

REED ROLLED THREAD DIE CO.

THREAD ROLLING MACHINES and DIES • KNURLS • THREAD ROLLS
Worcester, Massachusetts, U. S. A.

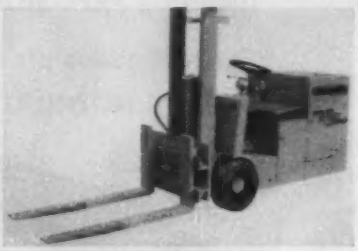
Sales Offices in: Buffalo, Chicago, Cleveland, Compton, Calif., Denver, Detroit, Englewood, N. J., Houston, Indianapolis, Milwaukee, Montreal, New York City, Phila., Pittsburgh, St. Louis, Syracuse, Toronto



Borg Electric Motors For Precision Equipment

Borg motors are offered in two- or four-pole synchronous or induction type with ratings of 1/2000, 1/1500, 1/1000, or 1/750 hp. with power dissipated within safe temperature rise. Motors are totally enclosed, using precision-machined die-cast alloys for end bells and gear train cases. Any of the series can be supplied with or without an internal gear train. Motors are designed for operation on 115-volt, 60-cycle power. Units may also be obtained with special voltages and frequencies.

The George W Borg Corporation, 120 So Main St, Janesville, Wis



Fork Truck Designed For Low Headroom Areas

Lo-Hed electric fork truck has been designed to provide protection against low overhead clearance objects while retaining shortest possible over-all length and turning radius.

Model has same general structure as the manufacturer's Palletier, but instead of having operator seated above battery compartment, seat is moved forward slightly. Extra high battery, of shorter length and no wider than conventional design, is used; over-all length of truck is increased slightly less than 6 in. With whole truck slung lower, a space of 36 in. from seat to top of mast has been obtained, adequate to exceed sitting height of operator.

Unit has a 48-in. lift, and is available in capacities of 2000, 3000, and 4000 lb.

Barrett-Cravens Co, Crescent Truck Div, 4609 S Western Blvd, Chicago 9, Ill

5304

FORGET OLD NOTIONS about engine lathes . . .

MEET THE MODERN..

- A LATHE TO SPARK YOUR FANCY
- A LATHE TO WIN YOUR LOYALTY
- A LATHE TO MEET YOUR NEED

BOYÉ & EMMES

HEAVY DUTY ENGINE LATHE

LONG LIFE

SERIES BB

EIGHTEEN SPEEDS

The outstanding value which is built into all Boye & Emmes Long Life, Heavy Duty Engine Lathes is evident in the extra quality features discussed in this folder. Compare Boye & Emmes specifications and features. You will find shorter shafts, more rigidity, greater speed ranges, more compact design throughout. Put one to work in *your* production and watch it become the "preferred" turning tool among the men who judge by day-in day-out performance.

HEAVY DUTY LATHES SINCE 1895

THE STORY is told in detail in Boye & Emmes Bulletin No. BB531

WRITE FOR IT! . . . no charge . .

BOYÉ & EMMES
MACHINE TOOL COMPANY
125 CALDWELL DRIVE
CINCINNATI 16, OHIO
MACHINE TOOL CENTER of the WORLD

REEVES

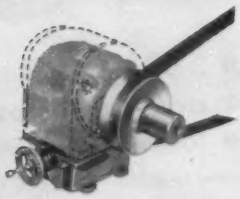
Vari-Speed Motor Pulley

Smaller Units!
More HP!

Completely new redesigned line from ½ to 15 HP!

NEW

"spiral-groove" lubrication



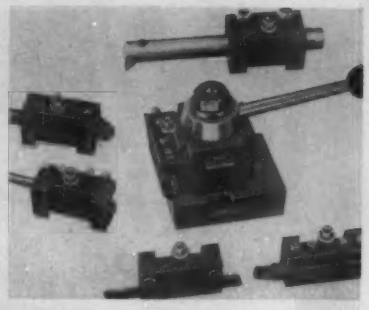
For new or old NEMA Motors

CHECK ALL THESE NEW REEVES FEATURES

1. New, smaller disc assemblies are engineered for new NEMA Motors, yet usable with old.
2. New spiral-groove lubrication assures complete lubrication for years of rust-free, trouble-free service.
3. One-point lubrication. Unit can be lubricated when stopped, or *while in operation.*
4. Superior base construction provides greater rigidity and strength, reduces vibration and noise.

REEVES PULLEY COMPANY • COLUMBUS, INDIANA

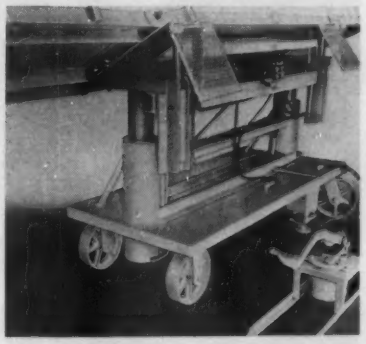
Write for complete details and new bulletin today!
Specify Dept. A8-V545.



Versatile Toolpost

Aloris has developed a toolpost to fit all lathes regardless of style of compound rest top. It comes with five interchangeable toolholders for turning, threading, drilling, cutting off, and boring. Toolholders can be changed in seconds by sliding out one holder and slipping in another to exact divisional preset position without changing setup. This feature permits resharpening toolbits in holder. Stud screw is provided for precision height adjustments. Toolposts are made in three sizes with toolbit capacities from ¼ to 1 in. and capacities of boring bars from ¼ to 1½ in.

Aloris Tool Co, Inc, 80-82 Fourth Ave, New York, NY



Sheet-Feeding Table

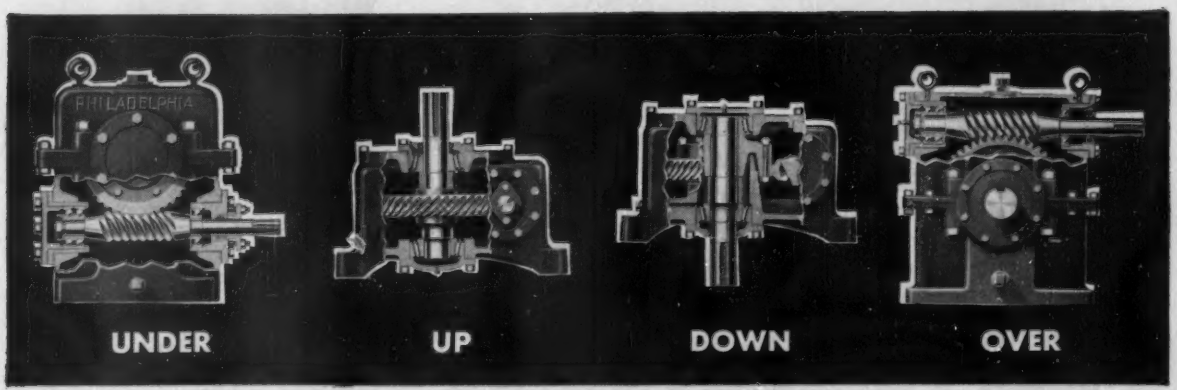
Designed for fast, accurate stock feeding into an inclinable bed press, this 3-ton capacity, hydraulic sheet-feeding table has hydraulically activated tilt top and built-in safety guards. Unit is operated by two-speed foot pump with two-way valve controlling both tilt and straight elevation of table.

Ten-inch heavy-duty steel casters with roller bearing hubs provide easy movement with heavy loads. Gripper floor lock, when depressed, securely brakes table against possible movement. Drop sides, when extended, allow fast handling of longer sheets and strips.

Rack Hydraulic Equipment Corp. Connellsville, Pa

for any size and type of WORM REDUCER

specify PHILADELPHIA ...and be safe



Type "AT" Philadelphia Heavy Duty Worm Gear Reducer, with worm shaft *below* the worm gear.

Type "UT" Heavy Duty, Vertical Worm Gear Reducer, with slow speed shaft extended upward.

Type "VT" Heavy Duty, Vertical Worm Gear Reducer, with slow speed shaft extending downward. (Note "dry-well" construction around downward shaft.)

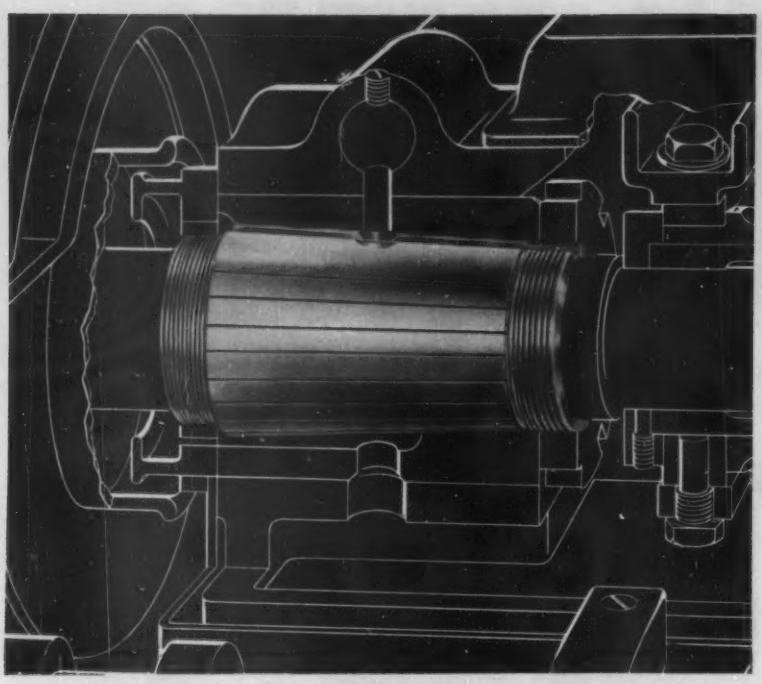
Type "RT" Philadelphia Heavy Duty Worm Gear Reducer, with worm shaft *above* the worm gear

PHILADELPHIA GEAR WORKS, INC.

ERIE AVE. AND G ST., PHILADELPHIA 34, PA.
NEW YORK • PITTSBURGH • CHICAGO • HOUSTON • LYNCHBURG, VA.

Industrial Gears & Speed Reducers

LimiTorque Valve Controls



THE WAY TO CUT...

Cost of assembly

The assembly of a unit equipped with sleeve bearings is the simplest, easiest, most understandable assembly possible. After the sleeve bearing has been assembled in the housing or other part that supports it, the shaft which is to operate in it is simply inserted in the bore of the bearing. There is no inboard end cover to assemble on the shaft first, no bearing to be pressed against the shaft shoulder, no lock nut or lock washer to lock the bearing to the shaft, and finally no outside end cover or enclosure to add before the assembly is complete. Not only do these additional parts cost additional money but their preparation for assembly and the actual assembly add serious cost which you can eliminate by using a good cast bronze sleeve bearing design.

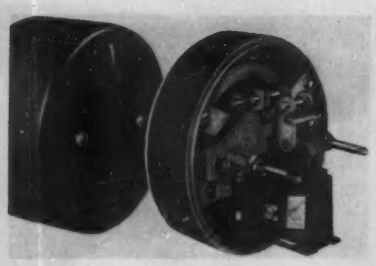
There is a Bunting Engineer near you. Consult him. Or write our Product Engineering Department at Toledo.

Bunting®

BRONZE BEARINGS • BUSHINGS • PRECISION BRONZE BARS

The Bunting Brass & Bronze Company • Toledo 1, Ohio

Branches in Principal Cities • Distributors Everywhere



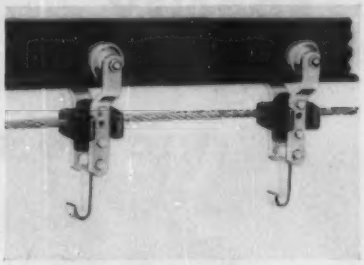
Magnetic Brakes For fhp Motors

A line of magnetic brakes for fhp motors is designated 40 Series and 50 Series.

The 40 Series mee s NEMA frame standards and 1/20 to 1/3-hp. range. It has 5-in. dia, is less than 3½ in. long, and has torque range from 6 lb-in. to 1 lb-ft.

The 50 Series is designed for 1/6 through 2-hp range. Four torque ratings are 1½, 3, 6, and 9 lb-ft.

Stearns Magnstic Inc, Milwaukee 46, Wis

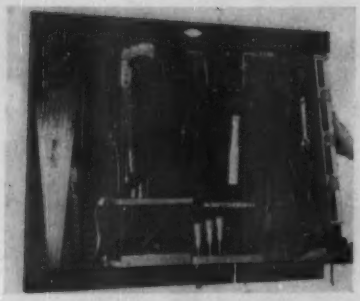


Cable Conveyor Design Increases Cable Life

Bush lock cable conveyor design is said to increase cable life more than 30 times, facilitate lubrication for protection against acid moisture and other deteriorating factors, and permit easy maintenance. Shorter radius horizontal and vertical curves conserve floor space by permitting a more compact layout. Both ¼ and ⅜-in. cable conveyors will operate on existing snub-lock design systems.

Trolleys feature cylindrical bushings permanently locked on accurate centers by high-pressure swaging to preformed galvanized or stainless steel cable. Two halves of an adapter block attached to trolley and load-bearing hook are bolted around the bushing. The rotary floating action of the bushing in the wide radius adapter block is reported to result in greatly increased cable life. ¼-in. size has bush-locks at 12- and 15-in. centers; ⅜-in. size has 12 3/32 and 15 1/16 in. centers.

The E W Buschman Co, 4364 Clifton Ave, Cincinnati 32, Ohio



All-Steel Utility Rack Has Removable Panels

All steel multi-use utility rack can be mounted individually or continuously and features removable, interchangeable panels. Rack can be used near workbench as storage rack for hand tools or elsewhere to hold accessories. It is mounted on wall with four screws and consists of two, three, or four panels that slip into 37-in. high frame. Each panel is 11 in. wide and is supplied with 12 hanger hooks and slotted tool-holder shelves.

Price for two-panel rack is $7.95; three-panel rack, $10.95; four-panel, $13.95.

Sturdi-Bilt Steel Products, Inc, 624 S Michigan Ave, Chicago Ill

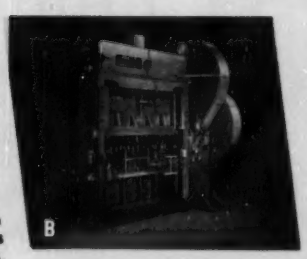
Drill Guide for Portable Tools

Guide-A-Drill is a newly patented tool that can be attached to housing of any portable electric or pneumatic drill in a few seconds. In position, Guide makes precision instrument out of hand drill, according to manufacturer. It is stated that results come within 0.005 in. by test. Controlled drilling of Guide saves drills, reamers, taps, and stops spoilage of work. Guide does not employ spirit level in construction. Work may be drilled on a radius. Guide will align a boring mill and also work on a lathe. Price is $6.95.

The Roy Silver Corp, P O Box 147, Devon, Conn

stamina + speed

On the cinder path, some runners perform like machines. They can maintain a steady speed and grueling pace for miles and miles. Then one day, as age overtakes them, they burn out and fall by the wayside. BEATTY machines are designed with "built in" stamina and speed. Unlike frailer performers, a BEATTY machine lasts for years and years. Your BEATTY built machine needs no training, no special diet, no personal pampering to keep it at peak efficiency for the "long runs". One of the machines shown should answer your production requirements. If not, our engineers will be happy to design and build to your exact needs.



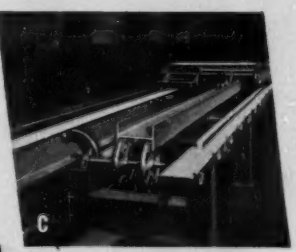
A. BEATTY Horizontal Hydraulic Bulldozer for heavy forming, flanging and bending.

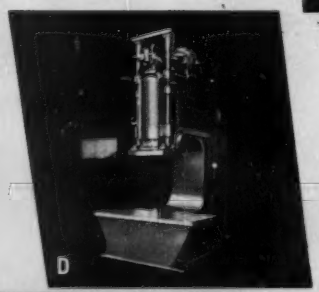
B. BEATTY Guillotine Beam Punch. Punches webs and flanges in "I" beams from 6 to 30 inches.

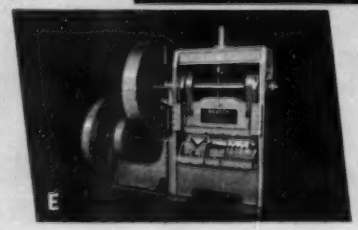
C. BEATTY Spacing Table handles web and flange punching without roll adjustment.

D. BEATTY Gap Type Press for forming, bending, flanging, pressing. Capacity 250 tons.

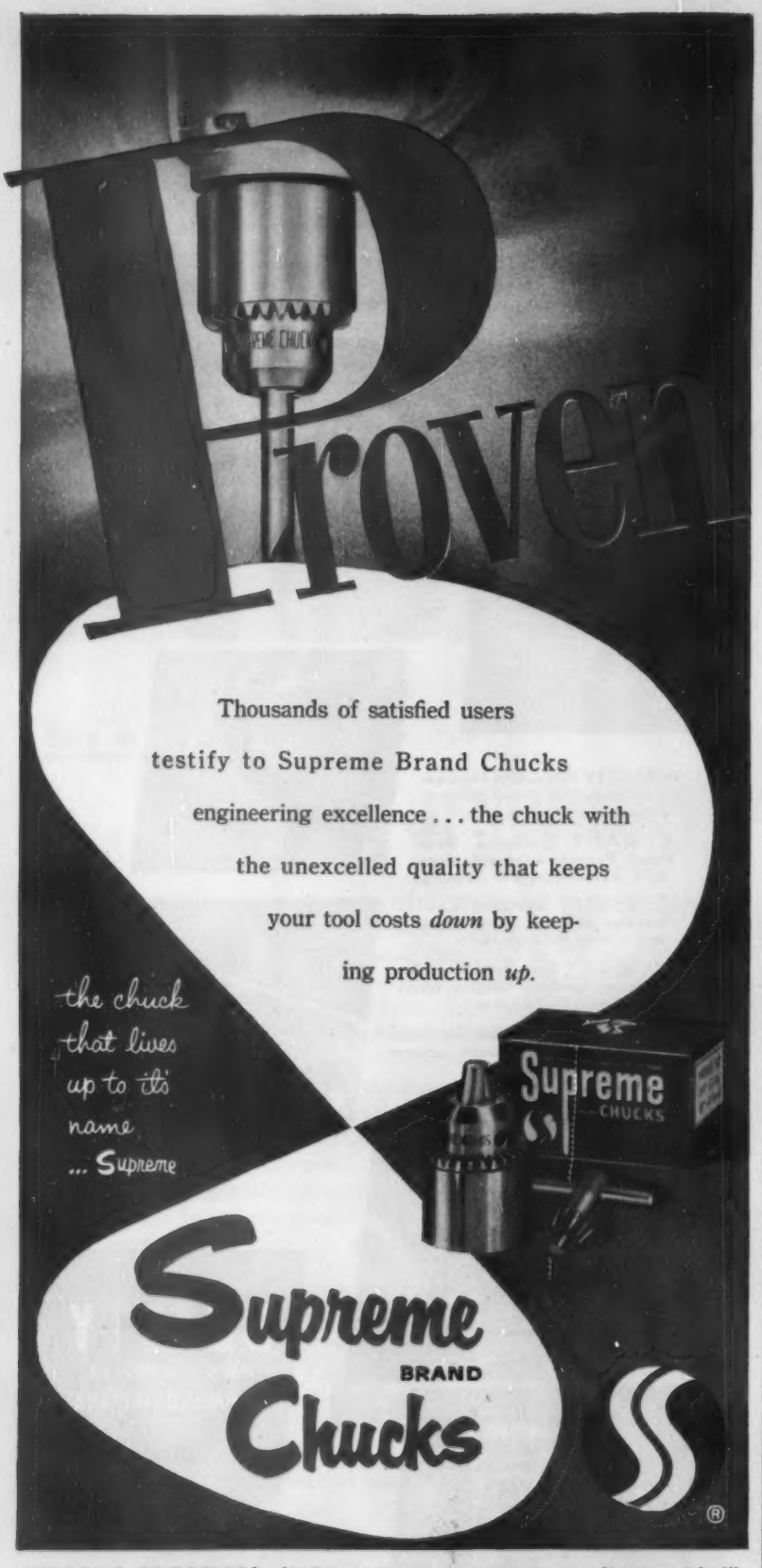
E. BEATTY Guillotine Bar Shear for angles, bars, rounds, squares without changing tools.



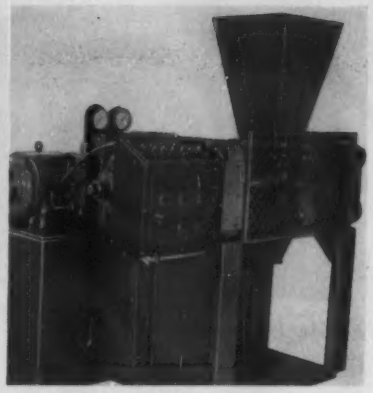




BEATTY
MACHINE & MFG. CO.
HAMMOND, INDIANA



SUPREME PRODUCTS, INC., 2222 So. Calumet Ave., Chicago 16, Ill.



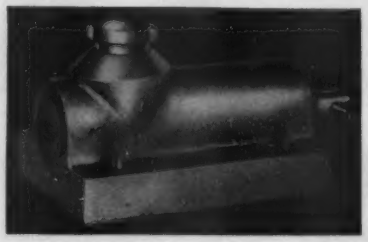
Hydraulic Preforming Press Makes 25-sq-in. Plastics

Electronic automatic control system on Logan preforming press has plug-in relays, cold-cathode tubes, and accuracy control of piston to 1/25 sec. Hydraulic pressures can be dial set and machine operated automatically.

Pressures range from 0 to 125 tons on the die, which may have single or multiple cavities; preform sizes produced up to 25 sq. in., 1¾ in. thick, and weight up to 1¾ lb. Weight and pill thickness can be controlled within ½%.

Gravity feed and discharge and full enclosure are features.

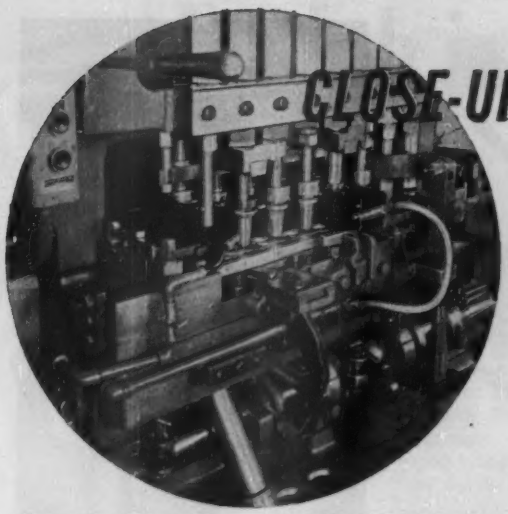
Logan Engineering Co, Hydraulic Div, 4901 Lawrence Ave, Chicago 30



Plunger Jack

Plunger jack is said to have advantage of overcoming vibration caused by machining operations. It is used to support forgings, castings, and other parts during operations. Positive locking action of the jack eliminates possibility of support button slipping downward until it is released intentionally. Precision machining and assembly of all working parts is reported to make possible a fast, yet positive up-and-down movement. Units are available in two models—the 7-50 with ⅛-in. button travel, 4 13/16-in overall length; the 7-55 with 3/16-in. travel and 7½-in. length.

Special Engineering Service, Inc, 8165 Livernois Ave, Detroit 4, Mich



Close-up of an 8-plunger WF cam eyelet machine showing tools and special attachments. Included are a lever type blank holder, a scrap box fitted with a compressed air blower and oscillating shutter, dovetailed punch holders and a hook type side stabber.

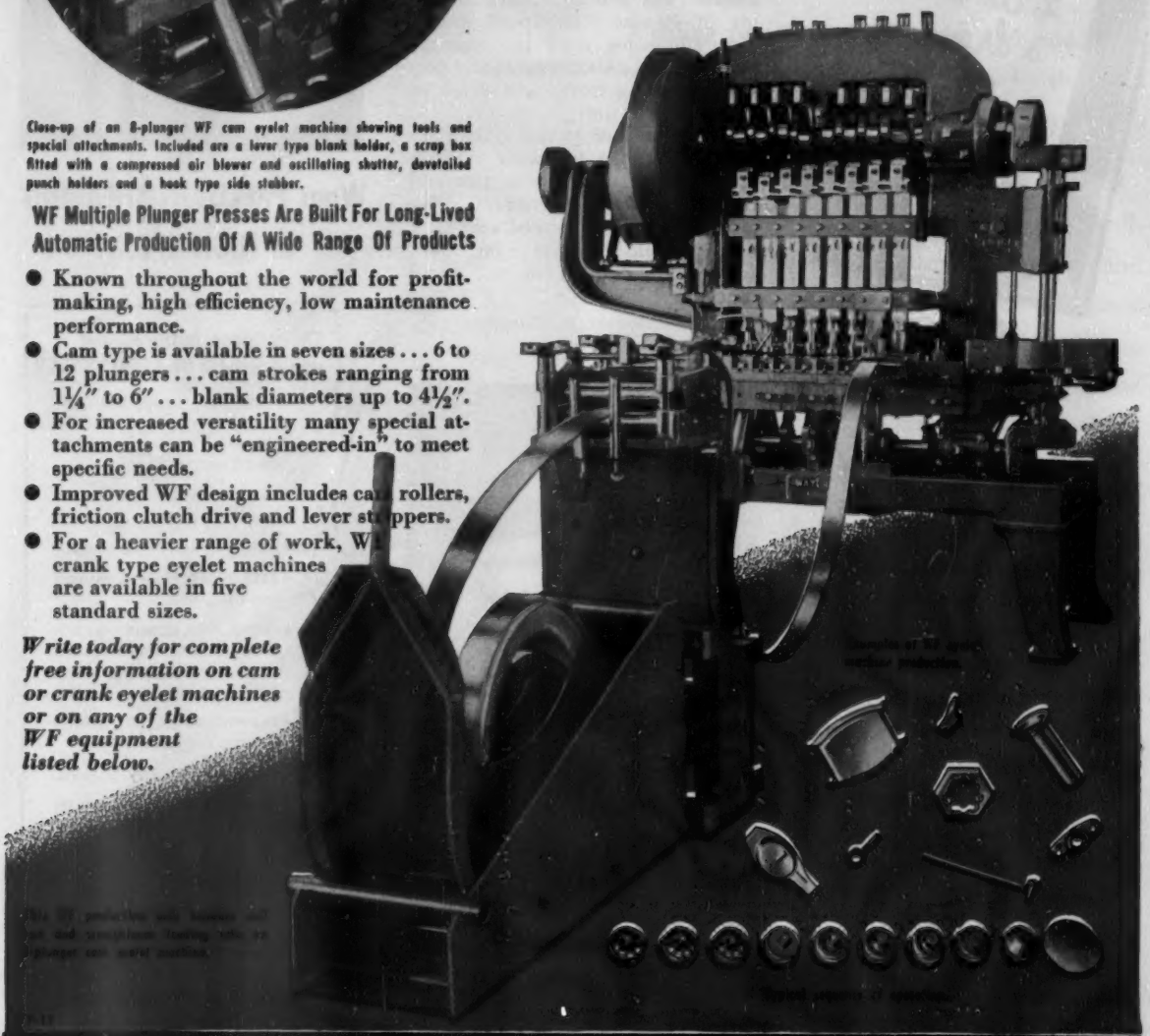
CLOSE-UP of versatile mass-production ability

Waterbury Farrel EYELET MACHINES

WF Multiple Plunger Presses Are Built For Long-Lived Automatic Production Of A Wide Range Of Products

- Known throughout the world for profit-making, high efficiency, low maintenance performance.
- Cam type is available in seven sizes . . . 6 to 12 plungers . . . cam strokes ranging from 1¼" to 6" . . . blank diameters up to 4½".
- For increased versatility many special attachments can be "engineered-in" to meet specific needs.
- Improved WF design includes cam rollers, friction clutch drive and lever stoppers.
- For a heavier range of work, WF crank type eyelet machines are available in five standard sizes.

Write today for complete free information on cam or crank eyelet machines or on any of the WF equipment listed below.



WATERBURY FARREL FOUNDRY & MACHINE CO. • WATERBURY, CONN.

Offices: Chicago, Cleveland and Millburn, N. J.

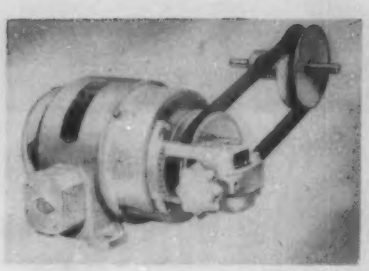
POWER PRESSES — Crank, Cam and Toggle, also Rack and Pinion Presses • Eyelet Machines • Multiple Plunger Presses • Horizontal and Hydraulic Presses, etc. MILL MACHINERY — Rolling Mills: Strip, Rod, Wire Flattening, (For Ferrous and Non Ferrous Metals) • Also Slitters • Straighteners • Cut-off Saws • Coilers • Winders, etc. WIRE MILL EQUIPMENT — Continuous Wire Drawing Machines (Upright Cone and Tandem) • Wire Flattening Mills • Chain Draw Benches • Pointers • Swagers • Bull Blocks • String-up Machines • Spoolers, etc. COLD PROCESS BOLT & NUT MACHINERY — Headers (all types) • Rivet Machinery • Trimmers • Thread Rolling Machines • Slotters • Nut Formers and Tappers, etc.

Handwriting of a man about to discover

the secret of cutting, forming, and grinding metals at top rates . . . with fewer rejects and longer tool, die, and abrasive life. You too will benefit from the modern compounds developed by specialists with 23 years of engineering and manufacturing experience. What's more, you'll like the friendly, cooperative approach that Bick engineers take in solving lubricant problems. To get the most out of your machines, always call Hans C. Bick to smooth and cool the way.

Hans C. Bick, INC.

READING, PENNSYLVANIA



Reuland Motor Designed For Reeves Drive

New motor design features special adapter and bell for direct mounting of Reeves Flexi-Speed drives. This eliminates need for separate foot-mounted index support and permits mounting motor and drive as single, aligned unit.

Motors adapted to this system are available in the following ratings: ½ and ¾ hp, available in 1800 and 1200 rpm input speeds (Reeves drive provides 8:1 or 6:1 speed range); 1 hp, available in 1800 rpm speed (drive provides 7:1 or 6:1 speed range).

Reuland Electric Co, Alhambra, Calif

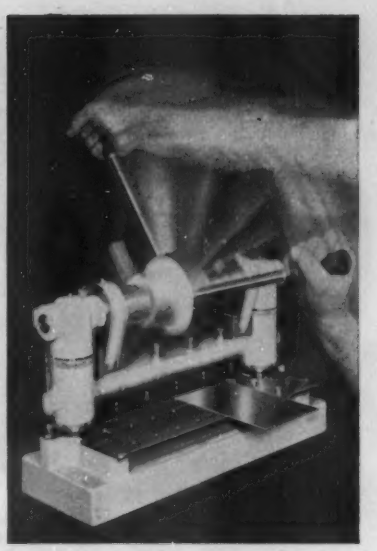
Universal Dial Comparator For Small Parts Checking

Universal dial comparator, designated JKA, has been introduced for quick, accurate reading of dimensions of very small parts, such as are used in precision screw machine work.

Simple gage release permits easy introduction of test pieces. Gaging table is adjustable and can be set at most favorable position for each job. To take a measurement, operator moves lever to the right, opening both the pincer jaws and the disks simultaneously. After part is in position, operating lever is released and a direct reading appears on dial. In addition to saving from 35 to 85% inspection time, unit reportedly can accomplish complicated measurements which previously required equipment costing much more.

Supplied in millimeters or inches; range: 0-10mm, graduation 0.01mm; range: 7/16, graduation 0.0005 in.

Mercury Supply Co, 410 Fairview, Elmhurst, Ill



Want PRECISION SHEARING at HIGH SPEED?

Check these features and you'll want a Di-ACRO* SHEAR

- **PRECISION** — strips less than .025" wide accurately sheared. Thousands of parts exactly duplicated.
- **CUTTING SPEED**—rivals that of power machines.
- **RATED CAPACITY**—16 gauge.
- **EASY TO OPERATE**—a woman can operate it.
- **CHOICE OF MODELS**—available in four sizes. Widths from 6 to 24 inches. Four power models also available.
- **ENGINEERING SERVICE**—always at your disposal.
- **PORTABLE**—readily moved.
- **RUGGEDLY BUILT**—backed by one year warranty.
- **DELIVERY**—immediate on most models.
- **COST**—that's good too.

*pronounced Die-ack-ro

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Send for 32-page catalog

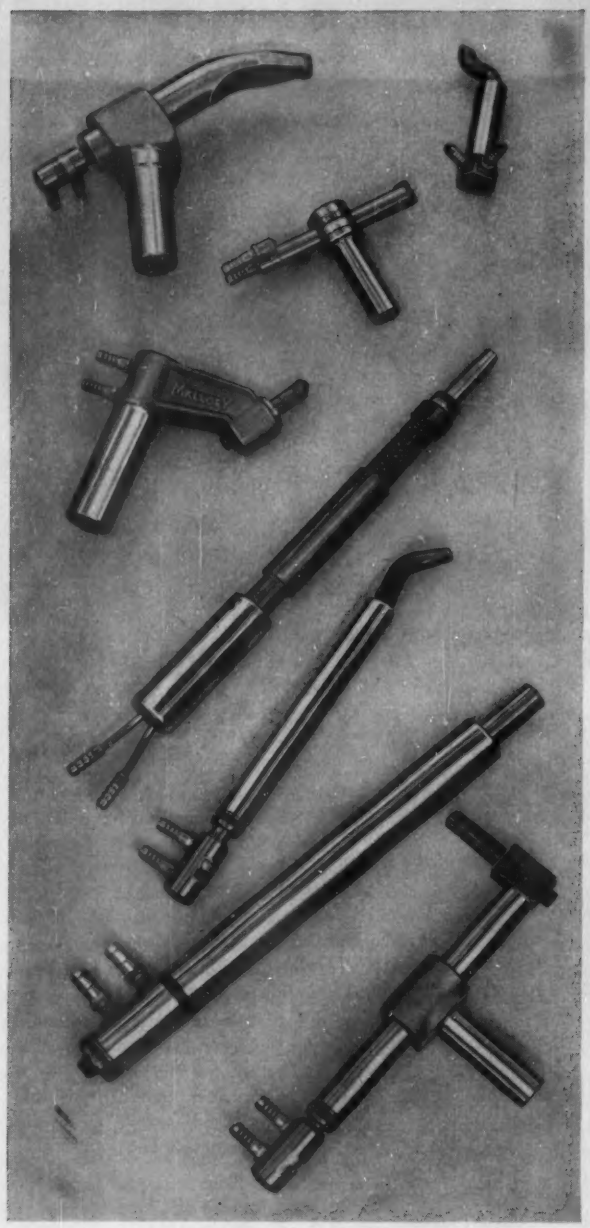
Gives full details on both hand and power operated Di-Acro Shears, Benders, Brakes, Notchers, Punch Presses, Rod Parters and Rollers. Mail your request today.

Creators of "DIE-LESS DUPLICATING"

di-acro PRECISION METALWORKING MACHINES

O'NEIL-IRWIN MFG. CO.
311 8th AVE.
LAKE CITY, MINN.

No Job is a "Special"...



with Mallory Resistance Welding Holders and Electrodes

Welding pressures from under 100 pounds to over 6000 pounds can be handled by standard Mallory holders and electrodes... available from stock.

In addition, holders and electrodes are available in such a wide variety of shapes and designs that standard units can be combined in an almost infinite number of combinations. Practically any resistance welding job can be done without the cost or delay of special designs.

The Mallory line is the result of over 25 years of experience in the development of special alloys and a complete range of designs. Write us, or ask your distributor, for the new Mallory Catalog. See for yourself the complete line of holders, electrodes, rods & bars, dies, castings, forgings, and accessories that are on the shelf for immediate delivery.

Expect more...
Get more from
MALLORY

In Canada, made and sold by Johnson Matthey and Mallory Ltd. 110 Industry Street, Toronto 15, Ontario

Serving Industry with These Products:
Electromechanical—Resistors • Switches • Television Tuners • Vibrators
Electrochemical—Capacitors • Rectifiers • Mercury Batteries
Metallurgical—Contacts • Special Metals and Ceramics • Welding Materials

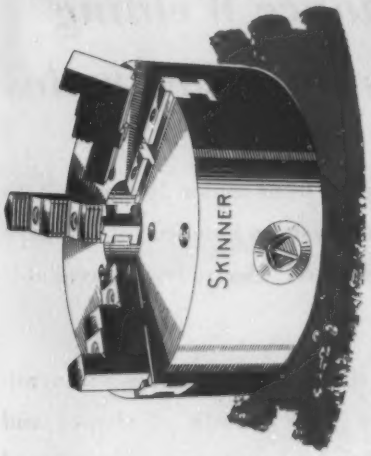
P.R. MALLORY & CO. Inc.
MALLORY
P. R. MALLORY & CO., Inc. INDIANAPOLIS

For information on titanium developments, contact Mallory-Sharon Titanium Corp., Niles, Ohio

SKINNER

precision self-centering

SCROLL CHUCKS



POWERFUL!
ACCURATE!
SAFE!
DURABLE!

Skinner self-centering scroll chucks are available in several models, for light, medium and heavy duty jobs in tool room or production runs.

All are of highest quality, made by the most modern machines and methods. Available in sizes from 3" to 18", with semi-steel or forged steel bodies, and heat-treated alloy steel for all other parts. Provided with two sets of solid jaws or two-piece jaws for holding internal or external work. Lands on jaw, jaw steps and end bites are ground after the chuck is assembled.

Write Skinner or your nearert Skinner distributor for illustrated folder.

THE CREST SKINNER CHUCKS OF QUALITY

THE SKINNER CHUCK COMPANY

203 Edgewood Avenue, New Britain, Conn.

Clark Fork Trucks Are UL Approved

Underwriters' Laboratories-approved Electric Carloader series fork trucks are for operation in hazardous areas in capacities from 3000 to 5000 lb. Units have an EX truck rating which means approval for operation in atmospheres containing explosive vapors. Carloaders have been modified to obtain approval. Modifications include special frame and totally enclosed explosion-proof panel, master switch and resistor, limit switches for seat brake, foot brake, hydraulic control valves, pump, and drive motor.

Clark Equipment Co, Battle Creek, Mich

Adjustable Snap Gage Measures Three Widths

Federal portable adjustable snap gage measures widths of Christmas-tree serrations in a jet-engine compressor-rotor disk. Insulated from heat transfer by wrap-around pregwood handle, gage measures all three rows of blade serrations regardless of angles. Uniform gage pressure is independent of operator.

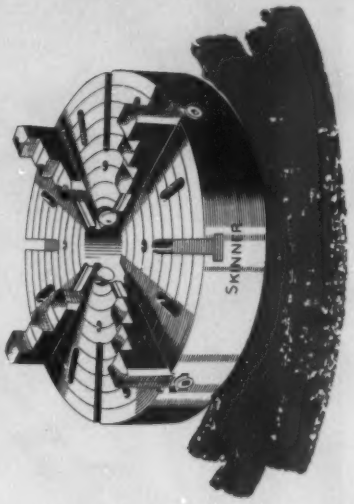
Tool-steel jaws are adjustable for extra-wide measuring range. Reference contact, a spherical tungsten carbide ball, and sensitive contact, two pieces of tungsten carbide rod, are accurately fastened to jaws.

Federal Products Corp, 1144 Eddy St, Providence, RI

SKINNER

precision independent

CHUCKS



POWERFUL!
ACCURATE!
SAFE!

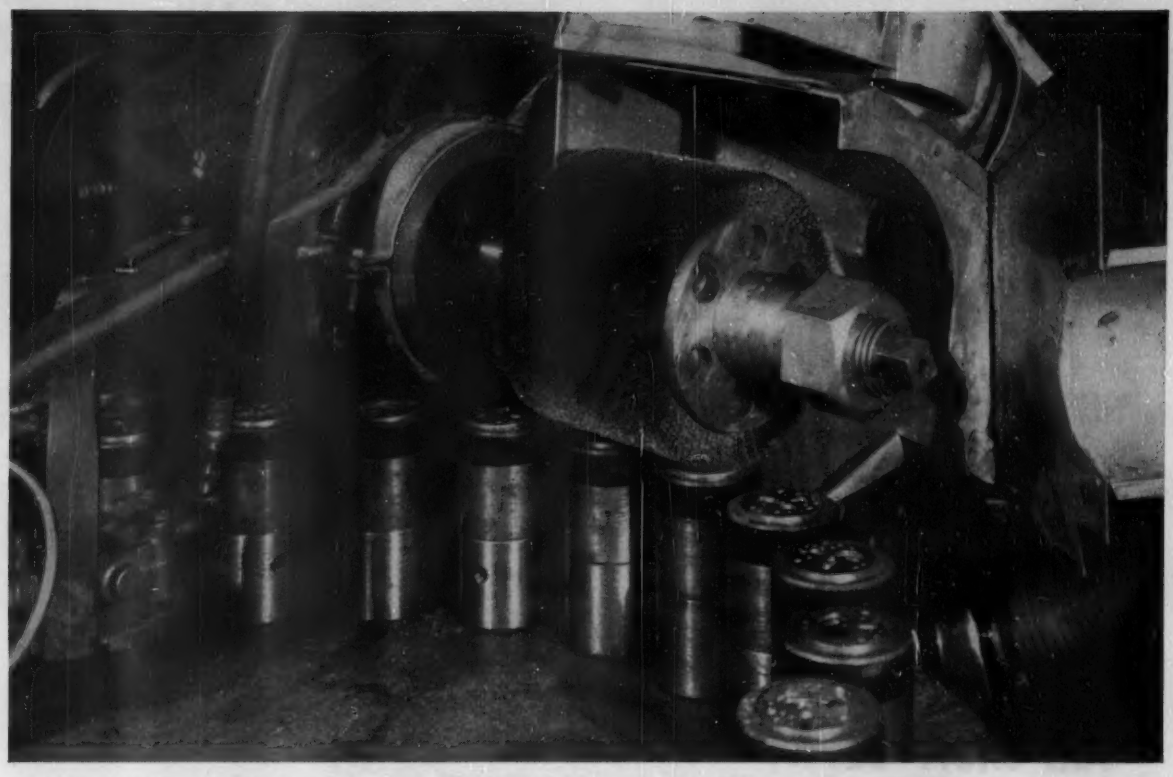
Skinner Independent Chucks are available in various models for medium and heavy duty tool room and general machine shop work. Sizes range from 4½" to 36", with semi-steel or steel bodies. All other parts are heat-treated alloy steel. Jaws are solid reversible or two-piece with reversible tops for either internal or external gripping. Soft blank top jaws available. The body surrounds more than 60% of each operating screw for the full length of the screw, to assure proper alignment and long life.

Write Skinner or your nearest Skinner distributor for illustrated folder.

THE CREST SKINNER CHUCKS OF QUALITY

THE SKINNER CHUCK COMPANY

203 Edgewood Avenue, New Britain, Conn.



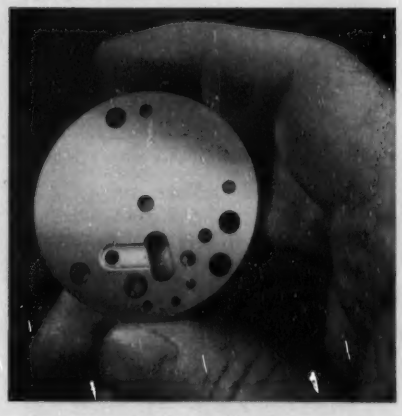
How to brush down finishing costs *automatically*

Power Brushing finishes both sides of these brass discs at a rate of 15,000 per machine per eight-hour day. It does a better, more uniform job many times faster than hand methods.

Parts are placed on spindles which rotate at 60 r.p.m. The table also turns at about one revolution in 25 seconds bringing the Osborn Economy® Section Brushes into contact with each part in turn. Spindles stop rotating as they approach the loading station, where a mechanism lifts finished parts and air pressure blows them into a chute.

A similar automatic operation with Osborn Power Brushing may improve the quality and speed of *your* cleaning, finishing and deburring operations . . . whether you process large parts or small . . . made of metallic or non-metallic materials. Ask your nearby **O**sborn **B**rushing **A**nalyst to appraise *your* possibilities. Write to *The Osborn Manufacturing Company, Dept. L-19, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

FREE: New booklet on deburring with Osborn Power Brushing. Ask for your copy.



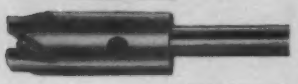
The finished part. Osborn Power Brushing removes feather burrs and blends surface junctures.

Osborn Brushes

OSBORN

OSBORN BRUSHING METHODS • POWER, MAINTENANCE AND PAINT BRUSHES • BRUSHING MACHINES • FOUNDRY MOLDING MACHINES

Which



HOLLOW MILL

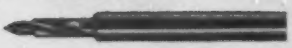
of these

STEP DRILL

multi-operation

COUNTERSINK

tools



COUNTERBORE

can short-cut

TREPAN

your

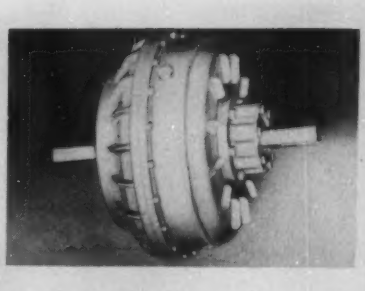
FOUR-STEP REAMER

machine time?

DOUBLE-ENDED STEP DRILL

Woodruff & Stokes design and produce small precision cutting tools to do, in a single operation, work often requiring as many as five separate machinings. Small, intricate holes of extremely close tolerances can be made quickly, easily, with W&S tools specially designed for each cutting problem. Let us tackle *your* problem—we may save you much valuable time.

WOODRUFF & STOKES CO., INC.
345 LINCOLN STREET
HINGHAM, MASSACHUSETTS



Automatic Winding and Tensioning Control

Hydro-Wind Drive offers automatic winding and tensioning control. Featuring improved construction and larger capacity, unit is available in Models 12.2 and 8.4. Improved features include rearrangement of gear train, better bearing spacing, and carbon - against - Meehanite spring-loaded seal.

Unit incorporates fluid coupling and planetary gear set. Ring gear is connected to impeller, or pump, of fluid coupling. Planet gear carrier is fixed to turbine or runner of fluid coupling, and sun gear is integral with output shaft. To mastermind the operation, the automatic slip of the fluid coupling reacts with the planetary gear set, transmitting increased torque necessary to maintain desired tension, while roll rpm decreases and roll diameter increases.

Twin Disc Clutch Co, Dept DS, Racine, Wis

Flash-Trimming Machine

Special vertical flash-trimming machine removes flash from inside and outside of thick-wall welded rings and cylinders. Trimmer has capacity of ¼-in.-minimum to ¾-in-maximum thickness and from 6-in.-minimum inside to 24-in.-max outside capacity. It is made in sizes for trimming 4-, 7-, and 10-in. lengths of work.

Machine is entirely hydraulically operated—piece to be trimmed is placed over inner clamp member and ram and foot-operated pushbutton starts cycle. Inner ram member moves forward hydraulically to clamp cylinder and both rams automatically cut on the draw-cut downward stroke. At end of cutting stroke, inside ram and clamp dies move to unclamp position and the rams return automatically to load position.

An ac 15-hp motor and control equipment provides suitable power. Approximate cutting speed of 60 fpm with 2 to 1 quick return is used.

Morton Manufacturing Co, Broadway and Hoyt, Muskegon Heights, Mich

Black & Decker Sander Grinder

Heavy-duty 7-in. sander-grinder for continuous production service is designed to perform almost all types of surfacing operations, can be used with abrasive disks or number of available accessories.

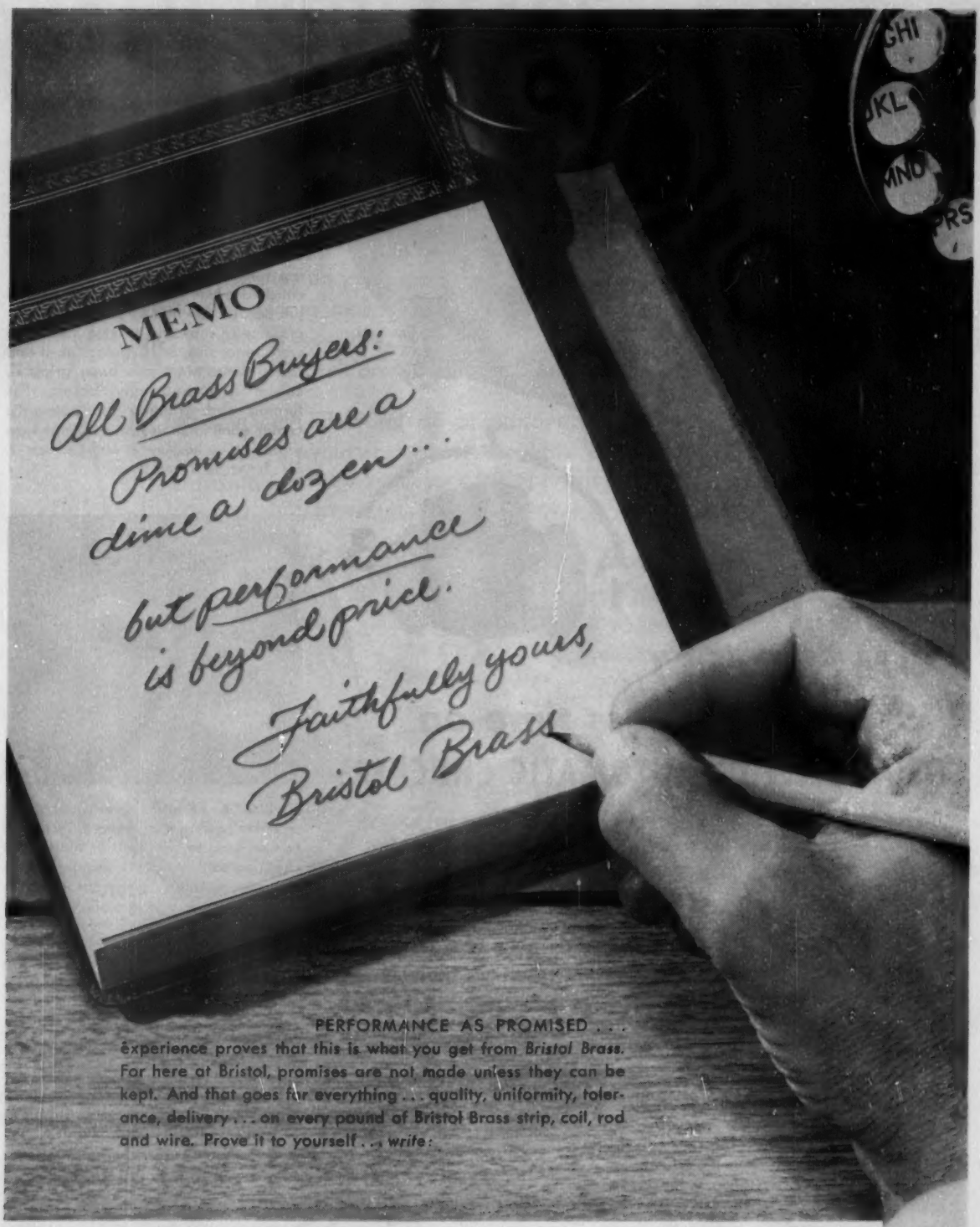
Features include B&D universal motor with 90% more power than previous 7-in. sander, yet tool is lighter, weighing 14 lb. Unit is available with no-load spindle speed of either 5200 or 6000 rpm.

Lubricant-sealed ball bearings are used throughout to eliminate periodic lubrication, and heat-treated spiral bevel gears provide even flow of power. Replaceable steel wear ring protects front of main housing from damage. Brush and commutator inspection is simplified by removable steel inspection plate.

Another feature is a housing designed so air from motor is deflected away from operator. Switch is enclosed to keep out abrasive dust and guards prevent switch being knocked on accidentally. Rear handle provides ample finger room, and removable side handle can be mounted on either side of tool.

Tool carries optional standard voltage of 115 or 220 v. Standard equipment includes spindle lock, 3-conductor cable and plug, reversible side handle, molded rubber pad, sanding disks, strap metal stand, clamp washer, suspension eye bolt.

The Black & Decker Mfg Co, Towson 4, Md



PERFORMANCE AS PROMISED . . .

experience proves that this is what you get from *Bristol Brass*. For here at Bristol, promises are not made unless they can be kept. And that goes for everything . . . quality, uniformity, tolerance, delivery . . . on every pound of Bristol Brass strip, coil, rod and wire. Prove it to yourself . . . *write:*

THE BRISTOL BRASS CORPORATION

has been making Brass strip, rod and wire here in Bristol, Connecticut since 1850, and has offices and warehouses in Boston, Chicago, Cleveland, Detroit, Milwaukee, New York, Philadelphia, Providence, Rochester. The Bristol Brass Corporation of California, 1217 East 6th St., Los Angeles 21. The Bristol Brass Corp. of Ohio, 1607 Broadway, Dayton.

"Bristol-Fashion" means **Brass at its Best**

More Pieces COMPLETELY *finished in less time on* GOSS & DeLEEUW AUTOMATIC CHUCKERS

This machine . . . already acknowledged and accepted as a metal-working achievement, and the only standard one of its kind . . . winds up a day's operation with all parts assigned to it completely finished and with no secondary operations necessary. When fully loaded, a complete piece is finished at each index cycle. High productivity is attained with simple tooling.

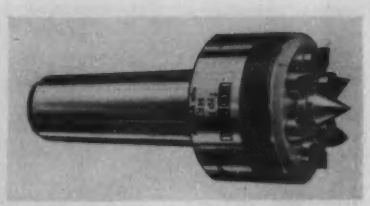
The "1-2-3" exclusive Goss & DeLeeuw feature provides for finish machining three ends of a part simultaneously or in sequence. All operations are performed in a single set-up, and complete finishing done in much shorter time than by conventional methods.

●

Send for illustrated literature which fully describes this recent Goss & DeLeeuw development in chuckers. Submit samples of your work for time and cost estimates.

GOSS & DeLEEUW
PRODUCT · QUANTITY

GOSS and DE LEEUW
MACHINE COMPANY, KENSINGTON, CONN., U.S.A.



AUTOMATIC DRIVING CENTER is reported to feature increased production, elimination of accidents, and accuracy in turning, milling, and grinding. Work can be removed or rechucked while machine is running and job can be finished in one setup. Longitudinally movable driving pins grip work regardless of irregularities of end face. When work has been gripped, center is automatically locked. For turning and grinding the automatic center eliminates use of dog and face plate — *Mera Machine & Mfg Co, Dept 1, 221 Spring St, Elizabeth, NJ*

JO-BLOCK FRAME obtains accurate sizes for setting dial bore gages, also can be used to hold rolls or balls when checking tapered depth gages. Frames replace parallels, eliminate difficulty arising when blocks are slightly worn, and possibility of dirt between blocks. Frames come in 1, 1½, 2, 2¼, and 3-in. dimensions. All gaging surfaces are lapped — *L E Ottney & Co, Box 469, Clawson, Mich*

Uni-Flux Works for Gas-Welding and Brazing

Flux is claimed to weld through lead, beryllium, aluminum, bronze, galvanize, copper, rust, grease, paint, tar, and dirt, and to eliminate need for cleaning.

Material produces inert atmosphere around weld area to prevent oxidation and float away foreign materials. Manufacturer recommends flux for brazing and welding cast iron, chrome, stainless, monel, aluminum, bronze, silver solder, and others.

Andco, Inc, 835 Thorne Ave, Orchard Park, N Y

WANT A NEW LEASE ON PROFITS?

KEMPSMITH HAS ANSWERS FOR THAT '54 DOLLAR-QUESTION!

To meet the stiffer competition in 1954 you cannot afford to burden your milling machines by paying extra overhead charges to absentee owners. When you own your Kempsmith milling machines, you pay yourself the full dividends on your investment. Outright ownership of a modern Kempsmith milling machine will help you hold your profit-line and remain competitive. By BUYING Kempsmith milling machines you can eliminate "double-charges" on your job costs.

You can buy KEMPSMITHS at reasonable cost . . . because they are designed to avoid costly non-essentials. Their practical performance advantages keep costs low for operation and maintenance. Get KEMPSMITH Millers and you get a new lease on profits.

• *You'll find* interesting data in Bulletin No. 134 on the new

IMPROVED TYPE "G" KEMPSMITH MILLING MACHINES

Write for this Bulletin Now!

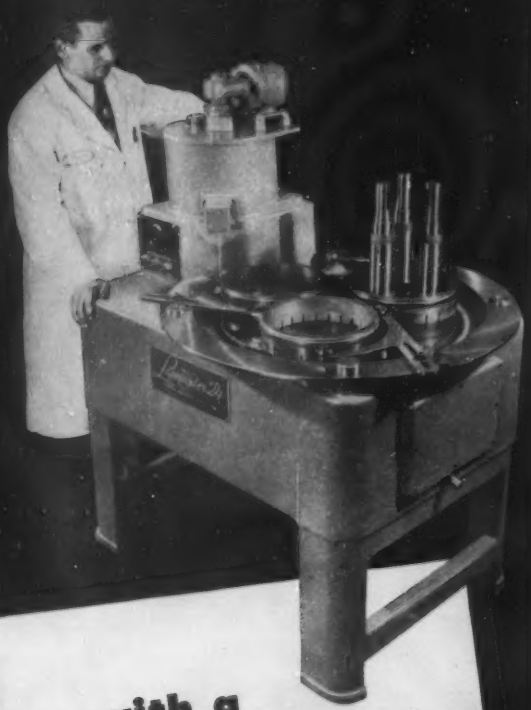
THERE'S A KEMPSMITH DISTRIBUTOR NEAR YOU . . .
Contact him
or write to . . . KEMPSMITH MACHINE CO., MILWAUKEE 14, WISCONSIN, U. S. A.

KEMPSMITH

PRECISION-BUILT MILLING MACHINES FOR 1954 PERFORMANCE

A 7015-1PC

Lapping For Precision Flatness and Parallelity in Production Quantities

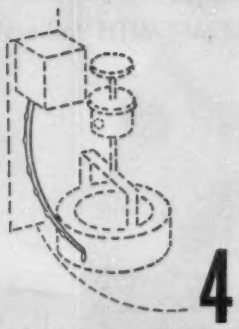


...with a LAPMASTER

This is the machine for you if you want precision flatness in production quantities at low cost. Lapmasters readily lap to the extreme close tolerance of one light band (.0000116") or less. In addition they produce an extremely fine finish to as low as 1 RMS. They are available with 12", 24", 48", 72" or 84" lapping plates.

This is how the Lapmaster works

These are some of the features of the Lapmaster



4

Loose abrasive distributed evenly over lapping area insured uniform results.

Another Feature— Lapping Shoulders

FREE Additional Facts

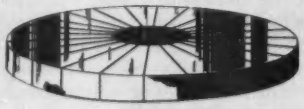
Lapmaster® DIVISION

I, a heavy cast iron lap plate revolved slowly under power. **II,** large cast iron conditioning rings are held in position and rotate freely on the lap. **III,** work pieces are placed inside the conditioning ring where they also rotate on the lap. **IV,** a liquid vehicle containing fine loose abrasive flows on the lap plate and is uniformly distributed under the work pieces. At the same time the rotating conditioning rings preserve the flatness of the lap plate. These three essential features, combined with the rapid cutting action of loose abrasive produces a flatness which meets every production requirement.

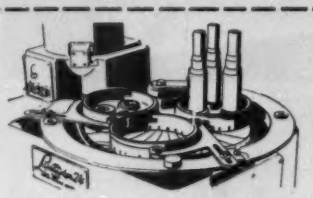
1 Operator requires no previous lapping experience.

2 Lapping with loose abrasive and without excessive pressure eliminates heat and subsequent distortion.

3 Simplicity of design provides accessibility and allows ease of loading and unloading.

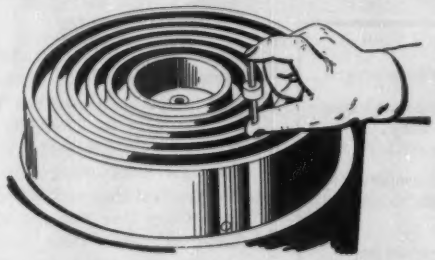


5 Serrated lap plate collects and disposes of spent compound and removed stock, also helps dissipate heat.



6 Precision laps identical parts in one cycle or parts of various shapes, heights and materials in one cycle.

7 Lap plate always kept in condition while in operation. No down time required for truing or reconditioning.



Lapping shoulders, heretofore impossible, is easily accomplished by providing the lapping plate with annular grooves. Conditioning rings are spring loaded.

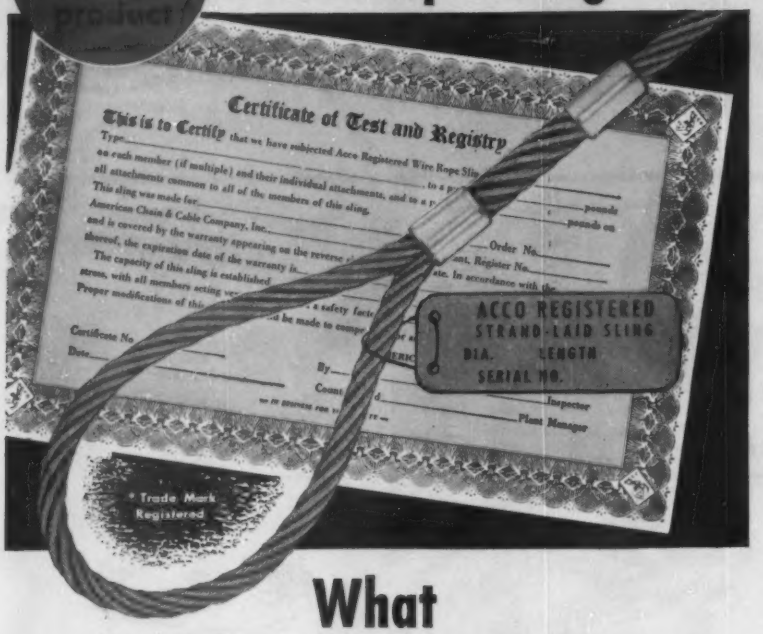
Learn more about the possibilities of production lapping and the interesting subject of measuring flatness. The illustrated fact-filled booklets are yours for the asking. Write today. Ask for Bulletin AM-6.

CRANE PACKING COMPANY, 1836 Cuyler Ave., Chicago 13, Ill.
In Canada: Crane Packing Company Ltd., 617 Parkdale Ave. N. Hamilton, Ont.

Protected by U.S. and foreign patents.

CRANE PACKING COMPANY

ACCO Registered* Wire Rope Slings



What ACCO Registered Means

• Primarily it means greater safety for your men and machines when loads are carried in the air in your shop. It means insurance against dropping a load which could tie up production.

But that's only part of the story. The name ACCO *Registered* on the slings you use means greater efficiency because of better design of endings and attachments. It means lower overall sling costs because every part of every ACCO *Registered* Wire Rope Sling has the same strength as the catalog breaking strength of the rope itself. ACCO even magnafluxes each hook to make doubly sure it will serve you well.

And it means that the sling has been proof-tested at the factory to twice its rated capacity. You can be sure that every ACCO *Registered* Wire Rope Sling is the safest, strongest and lowest cost lifting tool you have ever used.

Best of all, you can get them when you need them from a nearby stock. Contact your ACCO *Registered* distributor today for full information and prices. Or, write our Wilkes-Barre, Pa., office.

1. The best material
2. Unit safety factor (on bodies, rings, links, safety shackles, hooks)
3. Proof test of complete sling to twice rated capacity
4. Actual field service test of each model
5. Metal identification tag on each sling
6. Signed Registry Certificate with each sling

ACCO

Wire Rope Sling Department

AMERICAN CHAIN & CABLE

Wilkes-Barre, Pa., Chicago, Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn. • In Canada: Dominion Chain Co., Ltd., Niagara Falls, Ont.

Special Machine

Govro-Nelson machine drills right- and left-hand parts simultaneously. It incorporates four Govro-Nelson automatic drilling units and tap-drills two ¼-20 holes in two automobile door handles in one operation at rate of 600 parts per hour. Operator loads one of each parts, depresses start-cycle buttons, and work is automatically clamped, drilled, unclamped, and ejected.

Govro-Nelson Co, 1933 Antoinette, Detroit 8, Mich

Automatic Impact Tester

Automatic progressive and repeat impact testing machine determines breaking point of gear teeth, and studies dynamic properties of parts subject to shock.

A hammer of known weight is automatically raised and dropped on test specimen from progressively higher points until specimen breaks; quality of material is indicated from height of fall at fracture, and number of blows delivered. Height is increased by 1-in. increments for each succeeding stroke, or machine can be set to deliver impact repeatedly from any desired height between 6 in. and 10 ft. Specimen holder can be adjusted to accommodate test materials up to 24 in. in height.

Tinius Olsen Testing Machine Co, 1006 Easton Rd, Willow Grove, Pa

Electronic Counter

Model RC cold-cathode electronic counter operates at speeds to 10,000 counts per min and has total counting capacity of 9,999,999. It consists of electronic decimal unit preceding six-digit electromagnetic register. It is reported that complete independence from line voltage variations is featured. Unit may be used with photoelectric or capacity operated equipment and will function from practically any transducer or pick-up.

Haledy Electronics Co, 57 William St, New York 5, NY

Free-machining properties have been extended to Latrobe's entire line of high carbon-high chromium die steels. Development covers company's Select B, an air-hardening A-2 type steel; GNS, an oil-hardening steel of the D-3 type; Cobalt Chrome, air-hardening D-5 type; and BR-4, an air-hardening, super abrasion-resistant die steel. Improvement in machinability has no effect on physical properties or heat-treatment.

Latroble Steel Co, Latrobe, Pa

"Silica in die castings was shortening tool life"

Because of the silica content in zinc aluminum alloy die castings, a well known midwestern manufacturing company had the problem of shortened tool life. During a routine call, Sinclair Lubrication Engineer K. W. Cross learned of this difficulty in machining.

"After studying the problem I recommended Sinclair CADET® OIL 'Z' in place of the competitive cutting oil being used," Mr. Cross reports. "I was certain that its low viscosity, excellent wetting quality and ability to flow into deep holes to be threaded, would provide greater cooling and *longer tool life*.

"A test of Sinclair CADET OIL 'Z' proved I was right," Mr. Cross continued. "Moreover, due to the low viscosity of the oil, the machined parts had practically no carry-off, and consequently *oil consumption was reduced*. This company is now using Sinclair CADET OIL 'Z' for all machining of castings."

SINCLAIR LUBRICANTS

Why not give a Sinclair Lubrication Engineer the chance to help solve *your* cutting and lubrication problems? There's no obligation. Call your Sinclair Representative or write Sinclair Refining Company, Lubricating Sales Department, 600 Fifth Avenue, New York 20, N. Y.

CONSULT P&S FOR THE BEST

Materials HANDLING EQUIPMENT

CUSTOM BUILT TO MEET YOUR NEEDS

Item S-426
$67.20

STOCK CHECKER'S TRUCK

Designed to handle a large variety of items or parts. Three steel shelves with 1" flanges all around. Floor clearance 9½". Overall height to top shelf 42½", top of table 30". 44" long, 20" wide. All steel welded construction. Semi-crated approx. 190 lbs.

UTILITIES RACK
on wheels

Item NS-415M
$67.75
(Roller bearing, 6" x 2", all-metal wheels).

Item NS-415R
$70.20
(Ball bearing, 8" x 1½", rubber-tired wheels).

MACHINE TENDER
on wheels

Item NS-428R
$26.10
(rubber-tired wh'ls)

Item NS-428M
$24.10
(all-metal wh'ls)

Built of sheet steel and angle iron-welded construction—tubular handle—approx. weight 65 lbs. 30" by 16" x 32" high. Top deck 2" deep, lower one 3" turned edges all around.

Item NS-398
$51.15

HAND DUMP TRUCK

Reinforced heavy sheet steel, ½ cubic yard, capacity—two 8" semi-steel wheels and two 4" metal swivel casters. Wt. 125 lbs.

Item S-987
$115.50

Heavy Duty
WAREHOUSE TRUCK

Use anywhere heavy loads are moved and rubber tired wheels are desired. 54" long, 28" wide, 42" high at handle. Top of platform 14" off floor. Welded construction. Heavy ¼" plate. Two swivel wheels at handle end. Approx. wt. 300 lbs.

WHEN ORDERING always give "item" number. All PRICES are f.o.b. Detroit. Prices are subject to change without notice. Write for catalog.

DESIGNED AND MANUFACTURED BY

Palmer-Shile Co.

16019 Fullerton Ave. • Detroit 27, Mich.

"I don't care if they are our most important asset. You can't fill this safe with your MOLITE High Speed form tools."

COLUMBIA TOOL STEEL COMPANY • CHICAGO HEIGHTS, ILL.

Producers of fine tool steels — All types immediately available through Sales Offices, Warehouses and Representatives in Principal Cities.

TOOL COLUMBIA STEELS

Fork Lift Attachment Saves Space and Time

Overhead carton clamp with side shifter, designed for use on Lewis-Shepard electric fork trucks, clamps cartons from top and bottom. Package rests on small lower shelf and is securely clamped by the overhead rubber-lined arm. Safety interlock prevents retention unless object is in proper position.

Side shifter permits operator to move carton 4 in. to either side of center, without moving truck, for exact positioning of load. Both clamping and shifting operations are hydraulically controlled from cab seat.

Lewis-Shepard Products, Dept R-42, Watertown, Mass

Batch Cleaning Machine Is Fully Automatic

Magnus AJA LIF fully automatic multi-stage batch cleaning and processing machine consists of a series of independent, self-contained dipping units serviced by an automatic conveyor system. Dipping, raising, and transfer of parts from one stage to the following stages is not only fully automatic, but, in addition, work to be processed is agitated up and down in each solution according to a predetermined exposure time program.

Timing device makes it possible to vary processing cycle according to requirements. Equipment is air-powered. It is designed for any number of stages, alkaline or acids, and also drying operations; requires no special foundation, and can be installed in existing production line.

Magnus Chemical Co, Inc, Dept AM, Garwood, NJ

Portable Room Designed For Employee Hearing Tests

Prefabricated audiometric soundproof room has been designed for testing employees' hearing.

Unit, which measures 56 in. wide by 48 in. deep by 106 in. high, is constructed of special metal-clad acoustic panels with highly absorptive inside surfaces having a noise reduction coefficient rating of 95%. Equipped with a 12-in. shelf, light fixture, and electric outlet for the audiometer, room can be easily moved from one spot to another, or dismantled and re-erected. Large sizes available.

Industrial Acoustics Co, 341 Jackson Ave, New York 54, NY

Intermittent Duty Hoist

Light-service wire rope hoist, Lift About-Jr, designed for intermittent duty, is available in ¼ to 1-ton capacities. Can be supplied with collectors for regular conductor systems, or with a tag line; furnished either parallel or cross-mounted, with bolt, hook, or trolley suspension.

Speeds range from 12 to 25 fpm on dc-operated types, and 20 to 37 fpm on ac-operated units. Maximum lift is 16 ft on hook suspension units, 20 ft on all other frame sizes. Hoists may be equipped for either pushbutton or rope operation.

Shepard Niles Crane & Hoist Corp, Montour Falls, NY

Dollie Units for Moving Sheet Handlers

Dollie unit for use with Western sheet handlers consists of two handlers mounted back to back, well braced on a steel platform, with either stationary or swivel casters. Two units are tied together with 2-in. pipe which can vary from 4 to 12-ft long, depending upon length required. Intermediate supports are available, easily installed at any position between dollies. Purchasers furnish their own pipe, the length desired, and casters, determining type and size needed.

Each unit, including casters, weighs about 100 lb. Price of a pair, including four handlers, approximately $50, less casters.

Western Mfg Co, Arkansas City, Kan

Rubber-Cushioned Abrasives

A series of rubber-cushioned abrasives compounded with silicon carbide has been added to Brightboy line. Both aluminum-oxide and silicon-carbide types are being manufactured in a variety of abrasive grain sizes ranging from extra coarse to extra fine. Both types feature rubber binders compounded with abrasive grain, work on all metals, and in addition will do many jobs on plastics and laminated materials.

Brightboy Industrial Division, Weldon Roberts Co, Sixth Ave & North 13th St, Newark 7, NJ

Standard continuous-cast flat metal bars, made by Scovill, have been raised in weight and size from 2200 to 3100 lb. Non-welded brass coils rolled from this larger bar are approximately 40% longer, and their weight by inch of width is increased from 70 lb to 100.

Scovill Mfg Co, Waterbury, Conn

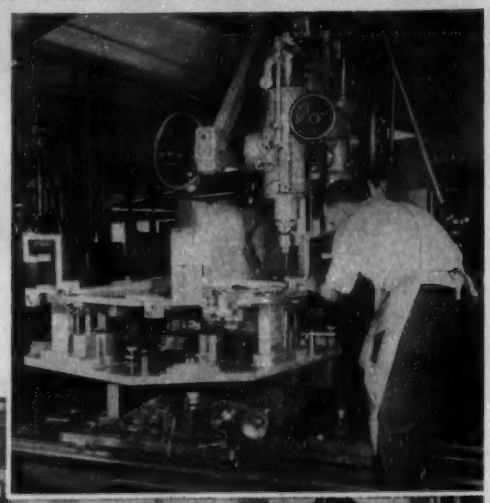
TOUGH PROJECTS OR PRECISION PRODUCTION CALLS FOR CONTRACT JIG BORING BY B. Jahn

BATTERIES OF THE LATEST JIG BORERS MANNED BY MASTER TOOLMAKERS MAINTAIN YOUR SPECIFICATIONS

. . . SCHEDULES

. . . SATISFACTION!

Jig boring a huge radar housing fixture. Over 200 individual holes were held to ten-thousandths tolerances.



In the large B. Jahn plant, 16 modern jig borers — in every size — are at the service of industry.

B. Jahn engineering superiority is continuously overcoming seemingly insurmountable jig boring obstacles. Whether it be a single fixture or a production run — a simple task or a real production headache — investigate B. Jahn contract jig boring and the dividends of time saved, money saved it can pay you.

DESIGN AND CONSTRUCTION OF DIES • TOOLS • JIGS • FIXTURES • GAGES • SPECIAL MACHINERY • JIG GRINDING • JIG BORING • KELLER DUPLICATING

FACILITY LIST AND LITERATURE SENT ON REQUEST. QUOTATIONS HANDLED PROMPTLY.

B. Jahn

B. JAHN MANUFACTURING COMPANY NEW BRITAIN, CONNECTICUT

McCaskey Tool Control in Winslow Mfg. crib serving production of tools, dies, jigs, fixtures and experimental work.

WINSLOW MFG. CO. reports their McCASKEY TOOL CONTROL *a dividend-paying investment*

Mr. J. A. Price, Gen. Mgr., Winslow Manufacturing Co., Cleveland, O., high-spots results of their investment in McCaskey Tool Control as follows:

"Substantial monthly dividends are earned (1) by instantly providing a dozen or more facts about tools and tooling essential to efficient and economical crib and shop operation, (2) by eliminating non-productive man and machine time that thrives on uncontrolled crib service, (3) by reducing and conserving tool purchases and (4) by minimizing crib overhead.

"Our plant and organization have grown considerably since McCaskey Control was adopted in November 1951 with an experienced, competent manager in charge of the crib. We all feel that McCaskey has proved to be a productive and profitable investment."

McCaskey Tool Crib Control . . . Gage Control . . . and other Industrial Control Systems . . . will pay similar dividends in your plant, large or small. Write us for complete information. No obligation, of course.

MAIL COUPON TODAY

McCASKEY REGISTER DIVISION
Victor Adding Machine Company
ALLIANCE, OHIO

Please send me McCaskey Tool Control procedure and factual reports from representative users.

Name .....

Position .....

Company .....

Address .....

AM-6-54

McCaskey
INDUSTRIAL CONTROLS
PRODUCTION - INVENTORY
TOOLS - MAINTENANCE - COSTS
THE McCASKEY REGISTER DIV.,
Victor Adding Machine Co.
ALLIANCE, OHIO
Galt, Canada Watford, England

Production Line Elevator Units Equipped With Selection System

Automatic production-line elevator units have been designed to fit into new or existing assembly lines. Fitted with solenoid-operated selectors, they may be adjusted to accept or pass by parts or packages according to weight or size. Power rollers on lifting platform are set to move load off elevator automatically with direction selected according to predetermined setting.

Unit can be set to accept cartons, either empty or filled, at lower level and raise them to higher level where power rollers move loaded containers forward to next station and send empties back to head of packaging line. Can also operate in reverse.

West Bend Equipment Corp, 335 Water St, West Bend, Wis

Light-Load Chilling Machine

Chilling machine designed to meet needs of small heat-treating departments, weighs 500 lb and is 20x18x43 in. Capacity of chamber is 1 cu ft; temperature range from –70 to –120F. Range from +250 to –120F can be obtained with addition of heater.

Refrigeration system is hermetically sealed, 110-volt, single-phase, 60-cycle. Chilling chamber is of electric welded steel, pressure tight, hot-dipped zinc coated to specifications. Chamber has rounded corners.

Cincinnati Sub Zero-Products Co, 3932 Reading Road, Cincinnati 29, Ohio

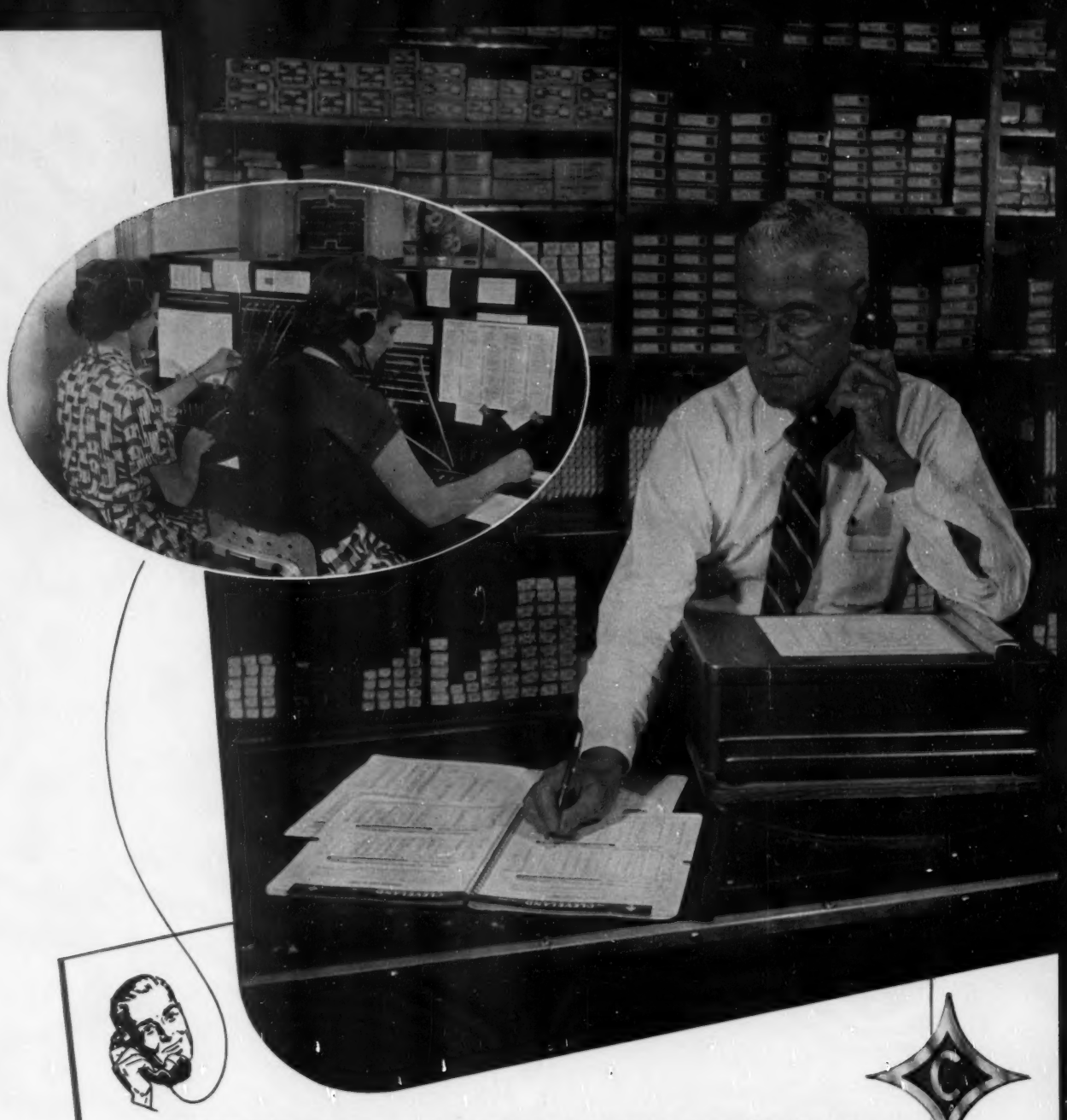
New Models of Turbo-Blast Machines

Models range in sizes from 20-gal. solution capacity to 2300-gal. capacity for applications in cleaning, degreasing, and stripping. All models are equipped with impellers which create fast-cleaning scrubbing action. Some models are equipped with baffle plate covers which permit agitation with two-layer stratified cleaning materials. Units are heated by steam, fuel oil, natural gas, or manufactured gas, thermostatically controlled.

Storm-Vulcan, Inc, 2225 Burbank, Dallas, Texas

All-purpose grease has anti-oxidant which is said to greatly increase high-temperature resistance, and prolong oxidation resistance. "Grezall" is marketed in 35-lb, and 100-lb kegs, and 400-lb barrel.

Tower Oil Co, N Canal St, Chicago, Ill



TELEPHONE YOUR INDUSTRIAL SUPPLY DISTRIBUTOR

SAVE TIME by getting what you need in a hurry
SAVE MONEY by cutting down your inventories
SAVE BOOKKEEPING by purchasing from one source

THE CLEVELAND TWIST DRILL CO.
1242 East 49th Street • Cleveland 14, Ohio
Stockrooms: New York 7 • Detroit 2 • Chicago 6 • Dallas 2 • San Francisco 5 • Los Angeles 58
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Close Tolerance

High Strength

YOU CAN HAVE ALL SIX ... PLUS *Uniform Machinability*

Fine Surface

Toughness

Hardenability

Maybe you want some of these properties in your steel parts. Or a combination of them. Or only one.

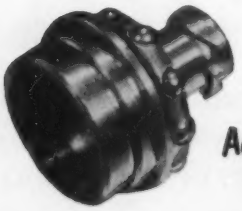
No matter which ones you need, you get them—plus *uniform machinability*—in Republic Cold Drawn Steels.

That's why so many manufacturers have come to Republic with their machining problems. Manufacturers whose costs and production records show their automatics aren't turning out what they could.

Republic's 3-D Metallurgical Service focuses the combined experience of the Field, Mill and Laboratory on your particular problem. And the recommendation you get is based on your plant, your product, and your equipment.

There's no reason to deny yourself this service. It costs only the price of a phone call to your nearest Republic office. And it can save you a lot. Do it today.

REPUBLIC STEEL CORPORATION
Alloy Steel Division • Massillon, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N.Y.



Accuracy of Section

REPUBLIC COLD DRAWN ALLOY STEEL BARS

REPUBLIC STEEL

Other Republic Products include Carbon and Stainless Steels—Sheets, Strip, Bars, Wire, Pig Iron, Steel and Plastic Pipe, Bolts and Nuts, Tubing

Water Purification Process

Hyla Process is a water-purification method said to effectively kill bacteria and eliminate bad odors and taste.

Hyla material consists of complex silver salts deposited on a common carrier material. Residual kill characteristic gives treated water ability to continue to kill bacteria long after water has been purified. Process supplies necessary control of amount of silver imparted to water, and can be combined with a new quantitive test technique to determine silver content.

Research, conducted by Johns Hopkins University, has been sponsored by Salem-Brosius, who is continuing to develop further applications of the process.

Salem-Brosius, Inc, 248 Fourth Ave, Pittsburgh 22, Pa

Quick, Accurate Process for Making Glass Comparator Charts

TRECO process, utilizing a direct contact reflex photographic system, can be applied for high-precision, rapid production of glass comparator charts for optical comparators.

Same negative used for making the chart can be used to make facsimile reproductions on sensitized metal from which 10X or 20X-size templets can be made. Templet may be utilized in making profile ground, high-precision gages, cams, and parts. Ground gage or part may be subsequently checked on an optical comparator against glass comparator chart.

Template Reproduction & Engineering Co, 401 N Broad St, Philadelphia 8, Pa

Universal Cyclops Uniloy 19-9DL alloy, an alloy steel designed for use in equipment operating under conditions involving high stresses and temperatures, is now commercially available in a limited size range in seamless tubular form. Alloy is said to have exceptionally good strength at temperatures up to 1200 F and has been used successfully at somewhat higher temperatures for some applications. Material is a predominately austenitic stainless containing chromium, nickel, molybdenum, tungsten, and small quantities of columbium, tantalum, and titanium. It is corrosion-resistant, having characteristics similar to high carbon, 18% chromium, 8% nickel stainless steel.

Babcock & Wilcox Co, Tubular Products Div, Beaver Falls, Pa

NEW MANCO RIVETEER

HIGH PRESSURE HYDRAULIC RIVETING

- **Fast, Silent, Powerful**
- **Compact, Light Weight**
- **Self-Contained, Direct High Pressure Pump**

Here's top efficiency in hydraulic riveting that not only is fast and easy on the operator, but assures better riveting. Easy to operate hand lever valve mounted on riveting head. Direct pump to cylinder connection eliminates intermediate valving and solenoids, making for low maintenance—trouble-free operation. Adjustable pressure setting for use on straight or shoulder rivets. Full swivel about cylinder axis permits easy placement. Compact electric hydraulic pump. Standard riveteers available in 10, 20, and 35-ton thrust models. Higher tonnages available in special models.

Model R-211-188 E.
Develops ten tons thrust.
Weighs 18 lbs.
See catalog for other models.

Please send Riveteer Catalog

MANCO MFG. CO.,
Bradley, Illinois, Dept. AM 6-B

Name.....

Firm.....

Street.....

City.....Zone.....State.....

2 Seconds

CAN SAVE YOU TWO HOURS!

Shims stamped from LAMINUM® look like solid metal but actually are made up of from 3 to 63 layers of .002 or .003 inch brass or steel.

Adjusting bevel gear mesh with a laminated shim is a matter of two seconds to remove a lamination!

The shim in this case is made of LAMINUM®, our exclusive material. It is a "solid" unit built up of 16 layers of .002 brass. It peels quickly and easily. Each shim removed adjusts the bevel gear position by two thousandths.

You save time by easier machining tolerances on the housing; ***you save time*** by eliminating pesky assembly machining; ***you save*** by not tying up a machine intermittently. IT'S EASIER!

SEND FOR LITERATURE

LAMINATED SHIM COMPANY, INC.

SHIM HEADQUARTERS SINCE 1913

Check Our Stampings Division For Your Stamped Parts Requirements

3106 UNION STREET • GLENBROOK, CONNECTICUT

Metagraphic Instruments

Three-part pneumatically operated instrument system known as Metagraphic includes transmitter, receiver (recorder or indicator), and a controller. Each unit is packaged separately and can be installed on process at best point. These instruments measure, indicate, record and control pressure, vacuum, temperature, liquid level, differential pressure, or flow. Universal 3 to 15-psi air-pressure signal interconnects three units. Receivers and controllers are designed for full plug-in service. Strip-chart recorders and indicators are interchangeable without loss of signal.

Additional information is contained in manufacturer's Bulletin A-106.

The Bristol Co, Waterbury 20, Conn

Air Gaging Cylinder Bores

Squareness of automobile cylinder bore with axis of crankshaft bore is inspected with Sheffield air gage consisting of chrome-plated gaging spindle connected to four-column Precisionaire and cylindrical bar for locating axis of crankshaft bore. Gaging spindle has two sets of Balljet gaging contacts along length for checking squareness and two Balljets in its V end to indicate when the spindle is properly positioned. Squareness is indicated by comparing float positions in two columns, while other two columns show when spindle is correctly located.

The Sheffield Corp, Dayton 1, Ohio

Universal Counter And Timer

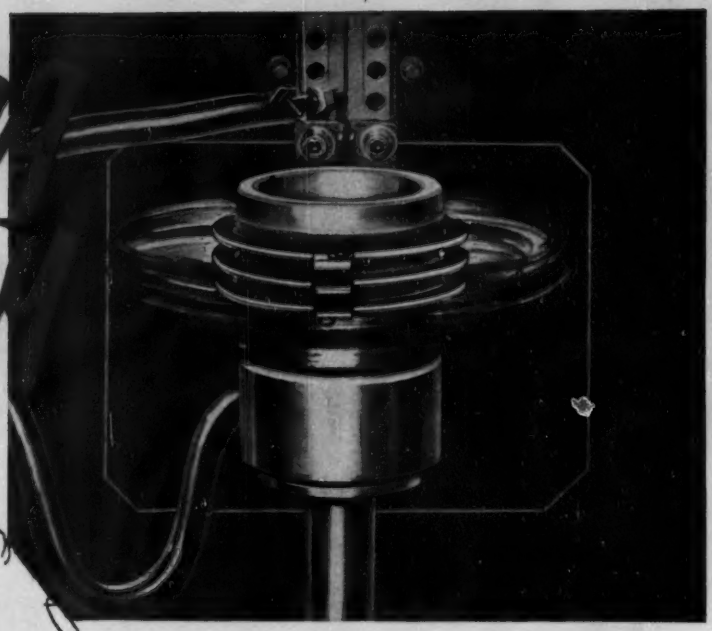
Berkeley Model 5510 is direct reading and capable of measuring and indicating time intervals from 3 microseconds to 1,000,000 seconds with accuracy of ±1 microsecond. It is capable of measuring and indicating frequencies from 0 to 1 megacycle with accuracy of ±1 cycle, or of measuring the period of frequencies from 0 cps upwards. Unit will also operate a straight forward electronic counter that rates to 1,000,000 cps.

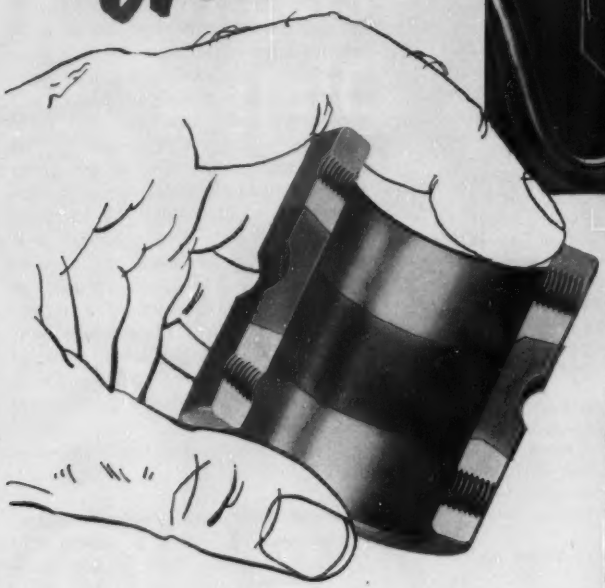
Berkeley Div, Beckman Instruments, Inc, 2200 Wright Ave, Richmond, Calif

Dispenser for antiseptic protective creams accommodates 12-oz tubes. Predetermined amount is dispensed with each stroke of the lever from tamper-proof unit.

West Disinfecting Co, 42-16 West St, Long Island City 1, NY

Blazing the way





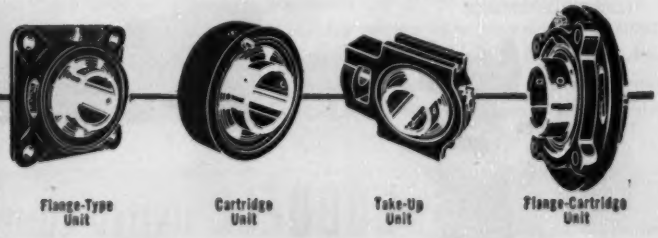
to greater bearing performance!

Here's another SEALMASTER patented exclusive in action! *Zone Hardening* is another in a long history of advances that includes: the *first* self-aligning, permanently-sealed industrial ball-bearing unit . . . the *first* outer-race locking pin . . . the *first* ball retainer riding the inner surface of the outer-race ring . . . all patented features! *Zone Hardening* is a completely automatic heat treating process by which the inner-race ring of SEALMASTER Ball Bearing Units are hardened through the ball path and adjacent section only. The extended portion of the inner-race is left in its original metallurgically soft, tough state. Hardened set-screws are mounted through this soft portion of the race, permitting race-to-shaft locking with increased holding power and greater resistance to vibration and shock. Firm lock of bearing to shaft minimizes danger of fretting corrosion and eliminates shaft wear.

This new feature is available on all SEALMASTER Bearing Units which includes a complete line of standard housings, as well as, numerous special designs.

For your copy of Catalog 454 call your SEALMASTER Distributor or write the factory:

SEALMASTER
BALL BEARING UNITS



SEALMASTER BEARINGS A DIVISION OF STEPHENS-ADAMSON MFG. CO.
16 RIDGEWAY AVENUE, AURORA, ILL.

get the best out of your tool steel through

PROPER DRESSING

FORGING HAMMER

FORGING FURNACE

POT FURNACE

QUENCH TANK

TEMPERING FURNACE

TOOL GRINDER

Here is a "Package" that will get rid of a costly and annoying problem . . . In fact, it will save up to 60% of costs for cutting and chipping tools . . . the best life is gotten out of today's steels through proper dressing . . . proper steel, properly treated, will reduce costs substantially. Now, at your own convenience, you can dress as many tools as are needed, and keep close control of your tool inventory.

The complete "Tool Dressing Package", entirely engineered by LOBDELL UNITED CO., (subsidiary of United Engineering and Foundry Co.) . . . includes all of the Forging, Heat Treating and Dressing Equipment . . . plus, the practical methods needed . . . and this "Package" not only reduces inventory costs, but it can do this at *low initial cost*, recoverable nominally in one year . . . without special metallurgical control.

The "versatile" NAZEL Electro-Pneumatic Forging Hammer is the LOBDELL UNITED CO. product . . . For the additional equipment presented within this "Package", LOBDELL is joined by a group of the most reputable leaders in their fields:

Heating Equipment by Eclipse Fuel Engineering Company

Tool Grinding Equipment by Black and Decker Company

Accessory Tools and Tool Steels by Bedford Tool and Forge Company

A copy of LOBDELL's new "Tool Dressing Package" Bulletin will give you further details.

LOBDELL UNITED COMPANY

1836-1954 WILMINGTON 99, DELAWARE

A SUBSIDIARY OF UNITED ENGINEERING AND FOUNDRY COMPANY

Series of environment - proof switches, designed for use in exposed locations in aircraft, features a hermetically sealed, split-contact switching unit enclosed in an aluminum housing. Performance is said to remain constant regardless of changes in atmospheric conditions; may be mounted near fuel tanks without danger of igniting escaping gases or liquids. Six mounting holes in housing are arranged to permit mounting switch from either side; drain holes allow drainage of any moisture collecting within housing.

Minneapolis - Honeywell Regulator Co, Micro Switch Div, Freeport, Ill

Straightaway muff-type sound protectors have been developed to give protection against both high and low-frequency injurious noise, are reportedly safe, sanitary, and comfortable to wear. Require no special fitting, are plainly visible to supervisory personnel, washable, and non-irritating to skin. Available in three styles: medium weight cotton helmet; lightweight, cool nylon-mesh helmet; and for intermittent use, the headband type. Helmets are designed for use with safety glasses and hard hats. Headband type permits use of safety glasses; helmet types come in varied colors; headband is black or white.

David Clark Co, Dept G-1, Worcester, Mass

Skinner four-way solenoid valve, designated V9 Series, is only 4 5/16 in. high. Units are leakproof, suitable for air, hydraulic oils, and other common media, and will operate in any position. Can control one double-acting cylinder or two single-acting cylinders. The 176 standard variations of capacities, metering, and types make these valves suitable for numerous applications. Three basic models available; normally open, normally closed, or combination—normally open and normally closed. Pressures range from 0 to 150 psi; orifice diameters from 3/64 to ⅛ in. Details in Bulletin 532.

Skinner Electric Valve Div, Skinner Chuck Co, Edgewood Ave, New Britain, Conn

Emergency blanket is available in a quick-release wall canister for use in event of injury or burning clothing. All-metal container is 8½ in. in dia by 20 in. high, finished in red enamel. Designed so that blanket only may be removed or entire unit lifted from the wall and taken to location of use. Blanket is 62x82 in., 80% wool.

Industrial Products Co, 2844 N Fourth St, Philadelphia 33, Pa

any way you look at it...

from grinding wheels to grain

SIMONDS means superior grinding

Fast, economical stock removal in high or low speed snagging! Micro-inch accuracy in precision grinding! Cool, non-burning action on expensive tool steels! No matter *how* you define "superior grinding", there's a Simonds product to fill the bill. Grinding wheels any size, any shape...also, mounted wheels and points, abrasive segments, polishing grain. Order from your Simonds' distributor.

SIMONDS
ABRASIVE CO.

PHILADELPHIA 37, PA.

BRANCH WAREHOUSES: BOSTON, DETROIT, CHICAGO, PORTLAND, SAN FRANCISCO • DISTRIBUTORS IN PRINCIPAL CITIES

DIVISION OF SIMONDS SAW AND STEEL CO., FITCHBURG, MASS. • OTHER SIMONDS COMPANIES: SIMONDS STEEL MILLS, LOCKPORT, N.Y., SIMONDS CANADA SAW CO., LTD., MONTREAL, QUEBEC AND SIMONDS CANADA ABRASIVE CO., LTD., ARVIDA, QUEBEC

The next time you're taking estimates on new presses let the Warco representative in your area give you the facts that have caused more people to buy Warco Presses the past year than ever before.

A few minutes with a Warco representative is all you'll need to see why the added quality designed and built into Warco Presses guarantee extra life at lower maintenance costs. You'll be introduced to many features, exclusive with Warco, that spell added safety, less operator fatigue and greater press speeds.

Too, your Warco representative is a specialist who'll work with you in getting a press that will do the most efficient job per dollar invested. And, you'll appreciate, like hundreds of others, the johnny-on-the-spot after sale service for which Warco representatives are noted.

So, next time you think of presses be sure you have the Warco story — it will pay you in the long run. Warco representatives located in all principal cities.

THE FEDERAL MACHINE & WELDER COMPANY

WARREN, OHIO

Federal® WELDERS

Warco PRESSES®

CESCO safety equipment, consisting of a head gear, hard hat, welding helmet, plastic shield, and a screen shield, can be utilized to make six combinations which formerly required 12 items, duplication coming in the head gears and hard hats. Basis for combinations is a mounting device which consists of wedge-shaped brackets which slide together and lock securely, and may be quickly unlocked. Tilting mechanism allows user to raise or lower helmet or shield without difficulty, and easily adjusted tension spring compensates for difference in weight of different pieces. Combinations consist of head gear and helmet or plastic shield, or wire screen shield; or hard hat with same protective equipment.

Chicago Eye Shield Co, 2300 W Warren Blvd, Chicago, Ill

Fluorescent lamp, said to produce 35% more light than any previous similar source, is available in a standard cool white model, 8 ft long with a 1½-in. dia. Rated at 110 w, it has a total light output of 6800 lumens; rated life is 7500 burning hours. Base incorporates two contacts recessed in a single element, and allows lamps to be inserted easily and safely in push-pull type lamp holders. Price, $3.85

General Electric Co, Nela Park, Cleveland 12, Ohio

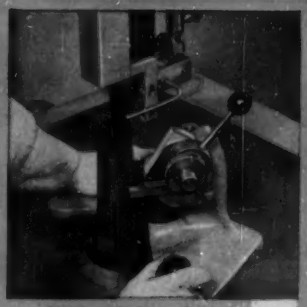
MSA Facegard has a molded headgear cap of glass fiber-reinforced cellulose construction bonded with resin for comfort and high strength. Visors are 12 in. wide for protection against side impact or splashes. Equipped with a replaceable foam-rubber sweatband; positive friction joint stops and holds visor at any desired angle over a 200° arc. Clear and medium green visors are available in 6- and 8-in. lengths, in 0.020- and 0.060-in. thickness. Details in Bulletin 0302.

Mine Safety Appliances Co, 201 N Braddock Ave, Pittsburgh 8, Pa

Dry-charge electric storage battery being manufactured is said to be able to retain its initial charge over much longer periods of time than previously possible, particularly under adverse temperature and moisture conditions. Principle involved may be applied to all batteries from submarine type to small sizes, and is expected to eliminate in large part the need for charging equipment.

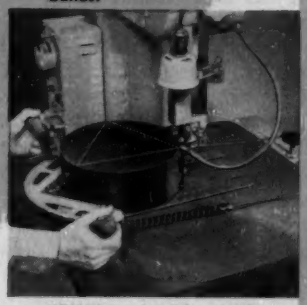
Gould-National Batteries, Inc, St. Paul, Minn

DoALL *Announces* A NEW LOW COST 16" CONTOUR MACHINE



NEW carbide tool finishing attachment with abrasive bands!

TILTING table plus mitering attachment produces compound angles.



HEAVY work slide attachment with power feed reduces fatigue, speeds work.

CUT-OFF and mitering attachment provides precision accuracy, speed.

RATCHET feed and work-holding jaw for ease and speed.

DISC cutting attachment produces perfect circles fast and easily.

RIP fence makes fast, precision cutting a simple job.

FILING—internal or external with DoALL file bands.

Now Any Plant Can Afford The Advantages of a DoALL!

HERE IS the greatest value ever offered in a 16" x 12" capacity multi-purpose contour saw: for toolroom and light production work . . . automatic power feed . . . fixed and variable speeds of 50 to 5200 blade feet per minute . . . for sawing, friction sawing, filing, polishing, carbide tool finishing.

There are five models, starting at $540 (less motor, starter and attachments). *You save money* because you do not have to buy more machine than is needed for the job. *You get more for your money* because these machines have DoALL quality and DoALL versatility through and through.

And, never before have machines in this size and price class been available with such a great variety of attachments. There is no class of work within their range which cannot be handled faster and at lower cost with these new DoALL's.

Ask for a demonstration in your own plant. Call your local DoALL Service-Store, or write:

The DoALL Company, Des Plaines, Ill.

DoALL

B-20

Call DoALL See classified phone directory for DoALL Store nearest you.

Machine Tools . . . Cutting Tools . . . Gages . . . Supplies

See this New DoALL in Operation

Ask For Free Demonstration at your Plant— No Obligation

SHELDON

CHICAGO U.S.A.

Are you suffering from overweight in machine tools?

It's hard to keep costs down if you have to do small work on big lathes. The charges against the job are too heavy—charges for tool investment, power costs, plant loadings for floor space, heat and light. Even labor costs run higher—it takes a skilled and experienced operator to handle a large, complex lathe.

With the lighter, faster SHELDON Precision Lathes, you can lower all of these costs, and get more pieces per hour too. A modern, moderate priced 10", 11" or 13" SHELDON Lathe with "Zero Precision" tapered roller bearings holds accuracy even at high speed. It has a wide range of speeds. It will deliver the power necessary to take heavy cuts, even when operating without back gears (direct drive) because it has double V-belts to the spindle. It has large collet capacity, an efficient multi-speed underneath motor drive, full quick change gearbox. Sheldon lathes offer the basic time saving advantages of large expensive lathes, in a smaller package—in the right size for most everyday work.

Write for catalog of modern Sheldon Machine Tools

TS-56B
11¼" Swing, 56" Bed
1⅜" Hole through spindle
"Zero Precision" Tapered Roller Bearings

SHELDON MACHINE CO., INC. 4234 N. Knox Ave. Chicago 41, Illinois

Kerodex barrier cream is said to protect against contact dermatitis due to primary irritants as well as against sensitizing agents encountered on the job. Can also be used as an aid in preventing recurrence. Cream which protects for as long as three to four hours, may be applied with equal safety and effectiveness to the face as well as the hands. Kerodex No. 71 protects against so-called wet work; No. 51 and No. 55 protect against dry work. No. 58 has been designed to protect against irritating action of light rays, either natural or artificial, also against the photosensitizing action of tar, pitch, and asphalt fumes. Supplied in tubes and jars; dispensers obtainable.

Ayerst Laboratories, Inc, 22 E 40th St, New York 16, NY

Alcoa has put out a light-weight corrugated aluminum sheet roofing material made of the same high-strength alloy as the standard 0.032-in. product. The new product, only 0.024-in. thick, has been designed to fill the need where narrow spans in the roof support structure do not require the extra high beam strength of the 0.032-in. material. New low-cost sheeting is supplied with corrugations ⅞-in. deep and a 2.67-in. pitch identical to the 0.032-in. standard product. It can be used for both new construction and re-roofing jobs. Adapted to use as the inner sheet, or as both inner and outer sheets of insulated wall construction that incorporates a center section of insulating material such as glass fiber.

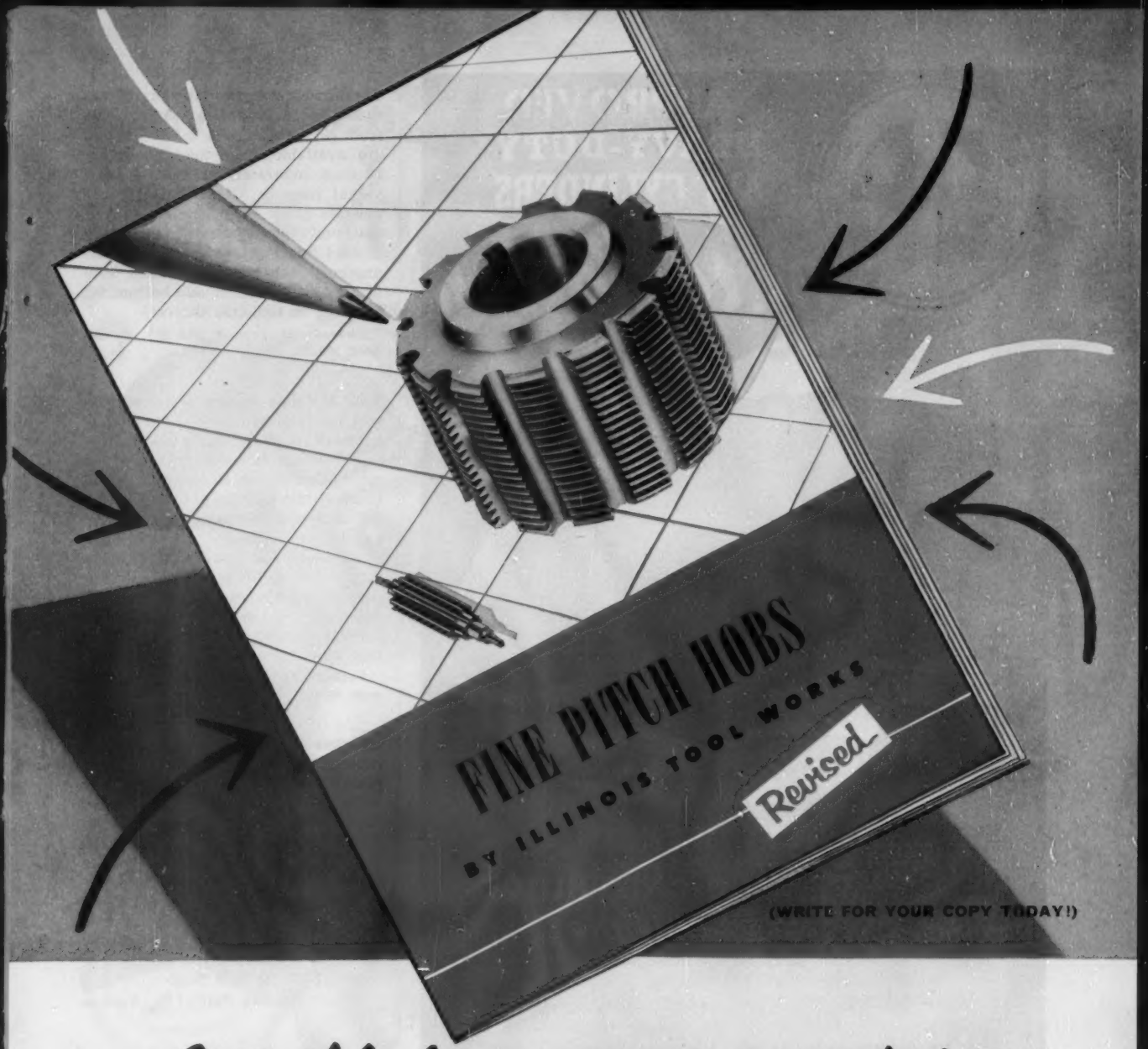
Aluminum Co of America, 805 Alcoa Building, Pittsburgh 19, Pa

No. 52 midget separator for handling light metal sheets has been added to the Basco line. Unit is 5 in. high, 3¼ in. wide, with base of the mounting plate extending back 1¾ in. The two-magnet separator eliminates need for using pointed tools which, in raising sheets, often scratch base colors and finish.

Basco Mfg Co, 5 Woodside St, Stamford, Conn

Meyco carbide inserted drill jig bushings for tough drill problems are available in headless press fit, head press fit, slip, and fixed renewable types, as well as in special specifications. Bushings are all steel on the outside for normal rough handling; inserted carbide rings at maximum points of wear provide long bushing life.

W F Meyers Co, Inc, Bedford, Ind.



Get this important new data...

ILLINOIS

TOOL WORKS
2501 North Keeler Avenue
Chicago 39, Illinois

to help you produce fine pitch gears at lower cost!

Here is a completely new discussion of fine pitch hobs... including latest applicable standards together with data on types, tolerances, performance and application.

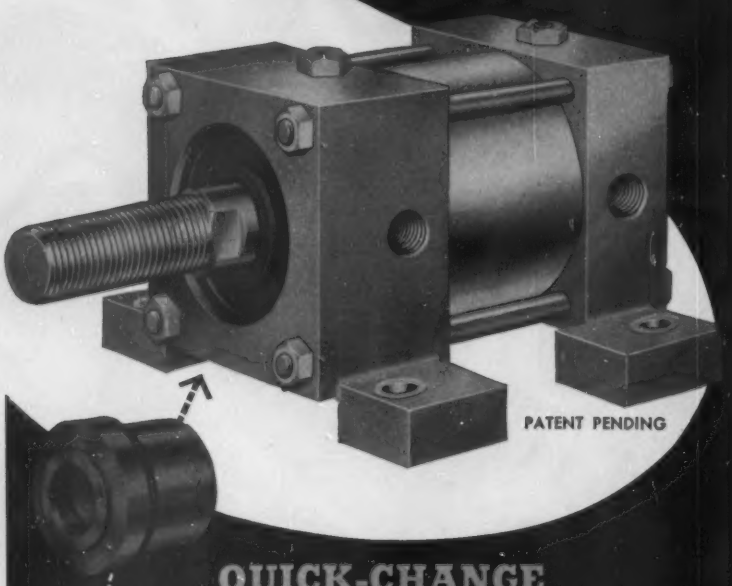
You'll learn about the Toolgraph* Chart, too... the exclusive, cost-saving "proof of accuracy" that you get with ILLINOIS TOOL WORKS Fine Pitch Hobs. This easy-to-read record of machine inspection eliminates complex, costly inspection operations in your plant.

Illinois Tool Works Fine Pitch Hobs Are Available From Stock

*T.M. Reg. U. S. Pat. Off.

SP

*APPROVED
HEAVY-DUTY
AIR CYLINDERS
for
Automation



QUICK-CHANGE
PACKING CARTRIDGE
Cuts Downtime

Step up production with rugged, service-free, S-P Heavy-Duty Air Cylinders:

- Designed for 200 PSI
- Rolled steel end plates
- Extra long cushions
- Extra large, hardened piston rod
- Minimum mounting and envelope dimensions
- 5 types of mountings
- 8 bore sizes, 1½" to 6"
- Double porting
- Interchangeable check and cushion valves
- Quick-change packing and bearing cartridge

* S-P Automation Cylinders were designed expressly for a large automobile manufacturer. They are thoroughly proven for automation and general heavy-duty applications. Prompt deliveries. Send for Catalog 109. For S-P standard Air Cylinders, request Catalog 102. The S-P Manufacturing Corp., 12415 Euclid Ave., Cleveland 6, Ohio.

SP
THE S-P MFG. CORP. — Cleveland
A Bassett Company
PRECISION PRODUCTS SINCE 1916
AIR AND HYDRAULIC CYLINDERS • POWER CHUCKS • ROTATING AIR CYLINDERS
COLLET AND DRILL PRESS CHUCKS • AIR PISTONS, VALVES AND ACCESSORIES

Threadwell plastic tap boxes are available for company's complete line from No. 0 through ½ in. Three sizes are available, each accommodating 12 taps, separately cradled in individual recesses. Clear crystal cover permits quick identification of contents and quantity. Built-in partitions protect fine cutting edges from one another; each box is provided with nesting ribs on cover and bottom for stacking on tool crib shelves.

Threadwell Tap & Die Co, Greenfield, Mass

Talk-A-Phone master selective system for intercommunication, said to have ten times the volume of conventional intercom systems, has been introduced for use in large areas and to overcome high noise levels. Model AC-5406, master station with five substation capacity, and AC-5411, with ten substation capacity, provide ample volume for paging on all positions in the system. Master can talk and listen to any one sub, or all simultaneously; only master plugs into an electrical outlet.

Talk-A-Phone, 1512 S Pulaski, Chicago 23, Ill

Eyeglass loupe, which may be used interchangeably on either metal or plastic spectacle frames, is available with either single or double lenses. Range of five powers is available in single-lens model: 3X, 3.3X, 4X, 5X, and 7X; double lens model provides alternative powers of 4X or 7X, depending on whether one or both lenses are used. When not in use, loupe swings completely out of eye range on a spring pivot. Single lens model, $3.25, double, $5.25.

Bausch & Lomb Optical Co, Rochester, NY

L-66 low-cost aluminum floodlight is equipped with ribbed trunnion bracket to permit 360° vertical or horizontal rotation. Unit has a 200-w general service lamp with a 946-candlepower beam. Weighs 4 lb, and is provided with a base suitable for portable use or permanent mounting.

General Electric Co, Lighting & Rectifier Dept, Schnectady 5, NY

X-L Veneer is a non-slip, non-skid safety topping for use on steps and floors. Material, troweled on, can be used over concrete, wood, steel, tile, mastic, or terrazzo floors, and is said to be impervious to oil and grease. It can also be used for skid-proofing steel floor plates.

The Monroe Co, Inc, 10703 Quebec Ave, Cleveland 6, Ohio

How AIRengineering can

REDUCE YOUR FASTENING COSTS

with IMPACTOOLS

from the smallest . . .

7/32" bolt capacity

to the largest . . .

4" bolt capacity

I-R Impactools can save you up to 90% of the time required to perform nut running and bolting-up operations by hand methods.

Whether your operation calls for tightening or loosening nuts on tiny fraction-of-an-inch bolts or larger bolts up to four inches thread size, there's an I-R Impactool to do the job faster and easier —and cut your fastening costs.

Call in an Ingersoll-Rand AIRengineer. He'll recommend the right I-R Impactools for your fastening operations. I-R Impactools — actually pay for themselves in days.

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AIRengineering . . .

the modern way to faster production

MOST PRACTICAL UNIT PILLOW BLOCK YOU CAN BUY

Let your SKF *Authorized Distributor* show you the "SY" Unit Pillow Block—the *one* that offers *all* the easy-maintenance features you've wished for.

BEST BEARING SEAL MADE

SKF Red-Seal, made of DuPont "Fairprene," with friction-free wiping contact in grooved inner race. The contact seal will release excess grease without popping out.

ROTATING FLINGER

slightly overlapped by outer race, works in conjunction with seal to form a labyrinth that effectively excludes dirt.

EASY TO MOUNT

on standard shafting. Just *slide* unit on shaft to proper location, and tighten 2 set screws. Tests prove this locking device withstands vibration. Spherical outer ring compensates for initial misalignment.

INTERCHANGEABLE

The "SY" Unit Pillow Block is interchangeable with existing installations by bolt hole spacing and center height features.

ALEMITE FITTING FOR RE-LUBRICATION

Note: Also available—the "FY" Flanged Mounting—same bearing unit but with housing that mounts on surface perpendicular to shaft . . . and the Single Row, Ball Bearing Aligning Unit that can be installed in many kinds of housings.

Action

This coupon will bring you Bulletin 370, with complete description, dimensional tables, available sizes, weights, etc.

SKF BEARINGS AND PILLOW BLOCKS

SKF INDUSTRIES, INC.

Manufacturers of SKF *and* HESS-BRIGHT® *bearings.*

FRONT ST. & ERIE AVE. PHILADELPHIA 32, PA.

Send Bulletin 370. I'm interested in Pillow Blocks

for_____ (specify)

*Name*_____ *Title*_____

*Company*_____

*Address*_____

*City*_____ *Zone*____ *State*_____

*Type of plant*_____

*Approx. number Pillow Blocks in service*_____

Line of pressure regulators, made of forged aluminum, is available for use with most compressed gases. Two-stage models are designated 1100 Series, single-stage, 1200 Series. Each includes range of models for use with oxygen, fuel gases, and inert gases over a wide range of pressure and volume requirements. A 4000-lb high-pressure gage is supplied on all models except fuel gas regulators, which are equipped with a 500-lb gage.

The K-G Equipment Co, Inc, 1744 Lehigh St, Allentown, Pa

Fostoria Localite line for lighting machine tools, assembly benches, and inspection uses, has arm joints of tension-disk design to provide easy adjustability with one hand. Reflectors rotate 360°; universal base provides for either vertical or horizontal mounting and is also adapatable to outlet boxes. Collet above the base revolves 360°. Models are available with 1, 2, or 3 arms, and various models of reflectors.

The Fostoria Pressed Steel Corp, Fostoria, Ohio

Plastic-impregnated woodwork bench tops are available in range of sizes. Specially developed finish with which they are lacquered, waxed, and filled is said to make them oil and grease-resistant, warpproof, splinter and dent-proof. The 26 standard sizes are priced from $16.50 for the 48 x 24-in. top of 1½-in. thickness to $61.20 for the 96 x 36-in. top of 2¼-in. thickness.

Sturdi-Bilt Steel Products, 624 S Michigan Ave, Chicago, Ill

Stemco Type A thermostat, a compact quick make-and-break unit for close control of temperatures in electronic, appliance, and industrial applications, uses a disk-design bimetal thermal element. Design permits bimetal to be heated by both conduction and radiation from controlled surface; bimetal is also electrically independent.

Stevens Mfg Co, Mansfield, Ohio

Wespo bolster bolts, with tensile strength of 149,500 psi, eliminates stretching, holding bolster plates more firmly to the press bed to protect expensive dies from injury due to shifting. Available in lengths from 4 to 22 in. Nuts and washers to fit are also available.

West Point Mfg Co, 26935 W 7 Mile Foad, Detroit 19, Mich

With saucer grinding wheel, new B&D Sander-Grinder smooths welds, cuts off studs, removes rivets . . .

Equipped with wire-cup brush, Sander-Grinder removes old paint, rust, scale, dirt from tanks, boilers . . .

With B&D Planer Head, Sander-Grinder rough-finishes wood, removes stencil marks from crates . . .

NEW B&D Sander-Grinder with 90% MORE POWER to Sand, to Grind, to Cut, to Brush!

Black & Decker's *new* 7-inch Heavy-Duty Sander-Grinder has almost *twice* the power of any previous model, it offers higher spindle speeds — your choice of 5,200 or 6,000 rpm — and becomes a more nearly *universal* tool for your shop or plant! Use it for continuous, heavy-duty production . . . and get faster schedules, more output per tool! A B&D-built universal motor, specially designed just for this tool, is your guarantee of 'round-the-clock production. Motor housing is protected from even abnormal abuse, and is contoured to direct exhaust air *away* from operator. Switch-guarded against accidental operation; ball bearings lubricant-sealed. Complete with pad, three sanding discs, all ready to *go*, for only $79.50! See the new B&D Sander-Grinder at your distributor's today, or write for *Free* Form No. 27. Address: THE BLACK & DECKER MFG. CO., Dept. 604, Towson 4, Maryland.

For nearest distributor, see "Tools-Electric"

LEADING DISTRIBUTORS EVERYWHERE SELL

Black & Decker

PORTABLE ELECTRIC TOOLS

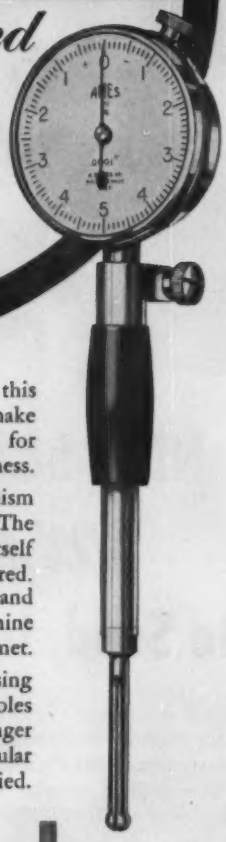
B&D

AMES

... the Preferred

FOR FAST, ACCURATE INSPECTIONS

Small Hole Gauge No. 36



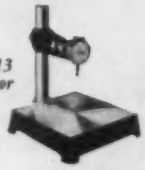
Skilled and unskilled employees can use this superbly designed two-point contact gauge to make quick, accurate, *impersonal* inspections of small holes for size, taper and roundness.

The Ames No. 36 has extremely sensitive mechanism especially designed to eliminate "feel" in measuring. The spherical contact point automatically centers itself and indicates the true diameter at the point measured. The operator has only to slide the contact in and around the hole and note the readings to determine if tolerances are being met.

The Ames Small Hole Gauge No. 36, using contacts in increments of 1/32", can check holes of 3/16" to 1" diameter, up to 2" depth. Longer lengths and special contacts to check irregular recesses, splines, etc., can be supplied.

Ames No. 15 Jaw Gauge

Ames No. 13 Dial Comparator



Ames No. 516 Dial Micrometer

Ames No. 25 Pocket Thickness Measure

If you would like to have our recommendations on your measurement problem, send blueprints and specifications. Write for your free copy of catalog on Ames precision measuring instruments.

Representatives in principal cities

B. C. AMES CO. 26 Ames Street Waltham 54, Mass.

Mfgr. of Micrometer Dial Gauges • Micrometer Dial Indicators

Gas-powered Clark Carloader fork trucks in 3000-5000-lb capacities are now available with Hydratork drive, a transmission which eliminates need for a gear shift, high and low gears, and a clutch and clutch pedal. Drive makes it possible to operate a gas-powered fork-truck with three simple controls — an accelerator, brake pedal, and forward-reverse selector lever located on steering column. Price for optional Hydratork drive, factory-installed, on Carloader series instead of a standard clutch is an additional $270.

Clark Equipment Co, Battle Creek Mich

Model 492 SV goggle for welding incorporates the Stac-Vent principle of goggle ventilation to prevent fogging. Provides draft ventilation at top and center of goggle where warm, moist air normally accumulates. Large openings for ventilation are safely shielded by the hood. Opaque plastic frame, large enough to fit over all prescription glasses, form-fits contours of face and nose, leaving no gaps. Goggles can be furnished with filter lenses in shades No. 3, 4, 5, or 6.

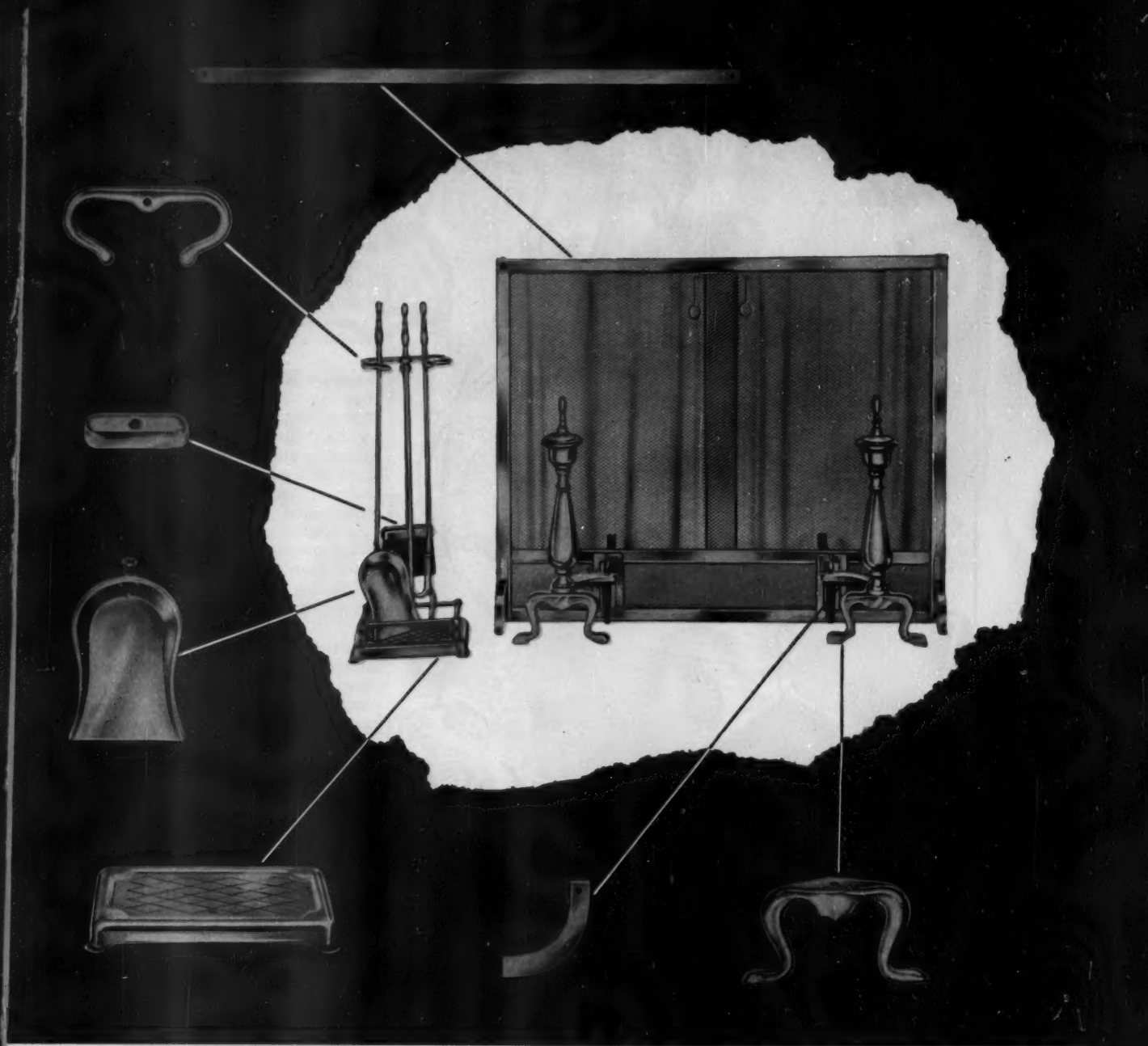
Watchemoket Optical Co, 232 West Exchange St, Providence RI

Stak-Mor pallet-stacking system has been designed to allow materials of almost any size or shape to be stacked in tiers. Vertical supports and a self-aligning system permit even crushable and irregularly-shaped items to be stored on pallets two or more tiers high, utilizing wasted air space in storage areas and warehouses. Single fork-truck operator can quickly remove and relocate whole tiers.

Stak-Mor Sales Co, 1931 Olive St, St Louis 3, Mo

Class 9007 Type T machine tool limit switch is designed for easy adjustment of basic device to obtain eleven different contact operating sequences using only a screwdriver. Variety of operating lever arms are available which can be mounted in any angular position; although only a small travel is required to operate switch, large amount of overtravel (approximately 80°) is provided in either direction. Basic switch units and lever arms are individually packaged so that different applications can be met by selecting proper lever arm for use with basic switch. Bulletin SM-239 provides further information.

Square D Co, 4041 N Richards St, Milwaukee 12, Wis



FORMBRITE'S SUPERFINE grain structure enables Special Products Co. to buff this equipment in half the time necessary with ordinary brasses.

New kind of brass called "FORMBRITE" cuts finishing costs

The bright, lustrous finish you see on this fireplace equipment — made of FORMBRITE* sheet metal — is the result of a simple color buff that took about half the time previously required. FORMBRITE's appearance after buffing speaks for itself.

FORMBRITE's superfine grain structure provides a surface far superior to ordinary drawing brasses. In every case, it's meant important savings in finishing costs . . . *and* improved product quality.

FORMBRITE is readily formed, drawn or embossed . . . results in products that are harder, stronger, "springier" and more scratch-resistant.

But don't take our word for it. Read what others say about this specially processed drawing brass:

Niagara Searchlight Corp. — "Cuts polishing and buffing time on flashlight end caps 50% . . . plating and general quality are improved, too."

Aeroplane Tackle Mfg. Co. — "We cut polishing costs over 25% . . . on several stamped products we get the required finish by a simple tumbling before lacquering or plating."

Sheaffer Pen Co. — "Savings in polishing costs are as high as 50%. Formbrite gives us a longer-lasting product."

Yet with all the plus values FORMBRITE offers over conventional brasses *it costs no more.* You can do it better, faster and cheaper with FORMBRITE. Want a sample? More information? Write: *The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.* *Reg. U. S. Pat. Off. 5488

Formbrite

an ANACONDA® product

made by The American Brass Company

for a fabulous finish...

Jewel Brand
ABRASIVE BELTS

For grinding, smoothing, polishing — metal, wood, leather, plastics, rubber. A grit for every purpose — prompt service on every purchase.

ABRASIVE PRODUCTS, INC.
561 Pearl Street
South Braintree 85, Massachusetts

Silicone-enameled magnet wire has been developed for use in electrical equipment operating at temperatures of at least 130 C. Wire is said to have good abrasion-resistance adheres well to conductor, is smooth, tough, and not attacked by common solvents. Enamel will not craze when exposed to solvents, and reportedly will not crack when subjected to extremely low temperatures. Dielectric strength is 1500 volts per mil.

Anaconda Wire & Cable Co, Muskegon, Mich

Flexrock No. 80 is a pressure-sensitive adhesive developed for bonding Teflon to itself and other materials. Will adhere Teflon to metals, glass, paper, or other plastics; said to have good acid and alkali-resistance, dielectric strength, excellent heat stability, and good low-temperature characteristics. Product retains usable pressure-sensitive characteristics from – 67 F to + 392 F.

Flexrock Co, Packing Div, 3600-A-Filbert St, Philadelphia 1, Pa

Riv-O-Seal, a device for sealing flush rivets and screws, said to eliminate need for sealing pastes, speeds assembly, and provides seal against gases or fluids at high and low pressures. Uses O-ring method of sealing, and is based on the company's Lock-O-Seal principle, whereby the relative mass to void is precision controlled. Provide a considerable weight saving, and are especially adaptable to assemblies such as integral tanks, cabin fuselage sealing, electronic devices, and instruments.

Franklin C Wolfe Co, 3644 Eastham Drive, Culver City, Calif

Thread sealing compound, designated Flexrock 25, Teflon Pipe Dope, is recommended for use on chrome, chrome plate, nickel steel, ceramic and plastic pipe threads, and for joining or connecting dissimliar materials. Good lubricating qualities are said to prevent galled threads and permit easier pipe joining which can be readily dismantled even after long periods of exposure to rigorous conditions. Available in 4-oz cans, at $5 for test purposes.

Flexrock Co, Packing Div, 3600-A-Filbert, Philadelphia 1, Pa

Stackbins with permanent or removable dividers are available to provide up to double the number of openings for all standard sizes; can be furnished in any standard size or in special on request.

Stackbin Corp, 1139 Main St, Pawtucket, RI

TO EACH HIS OWN

A Fable

(our apologies to Aesop)

with added comments on Grinding Oils

A dog, a cat and a horse lived and worked on a farm together, each doing his own job well. However, each thought the other had an easier job . . . and one day they decided to change.

The cat became a watchdog, but failed to scare any thieves away; the horse tried to catch mice and kicked out the side of the barn; the dog almost had a sunstroke trying to pull the plow and wagon. Each quickly became tired and discouraged. All were most happy to return to the work they were able to do best.

The Comments:

THERE are three types of grinding fluids . . . "hard" for grinding soft, tough stringy materials; "soft" for grinding materials of high hardness; and "medium" for use in grinding the wide range of average work . . . and like the dog, the cat and the horse, each works best at its own job and not one is good for every job.

Experience has led D. A. Stuart Oil Co. to develop grinding fluids to meet the various conditions and problems *you* may encounter. Better wheel form and longer wheel life, better surface finish and closer tolerance control are some of the results you may expect when using the *right* Stuart grinding fluid for the job. And to assist in selecting the proper grinding fluid for your particular needs is your Stuart Service Engineer. Fill out the coupon below today for a Stuart Precision Grinding Oils Bulletin . . . and be sure to ask to have a Stuart Engineer call.

More than a "Coolant" is Needed

D. A. Stuart Oil Co.

Time-tested Cutting Fluids and Lubricants

2729 S. Troy Street • Chicago 23, Illinois

for a STUART PRECISION GRINDING OILS BULLETIN FILL IN AND CLIP TO YOUR COMPANY LETTERHEAD AND MAIL TO

D. A. Stuart Oil Co., 2729 S. Troy St., Chicago 23, Ill.

Name .....

Title .....

☐ Please have a Stuart Service Engineer call.

FOR "SPECIAL" CUTTERS AT STANDARD PRICES!

CHECK THE NELCO CATALOG!

NEARLY 800 DIFFERENT NELCO TOOLS ARE REGULARLY STOCKED TO FILL 90% OF ALL SPECIAL TOOL APPLICATIONS!

Before ordering costly *special* cutters, investigate NELCO — chances are the tool to do the job is waiting — without delay! Without extra cost! There are, for example, 47 *Standard* Series 300 Nelco Side Milling Cutters for working cast iron, brass and bronze. 6 teeth to 24 teeth — diameters from 3" to 12" — teeth graduated from 3/32" to 1" in width — from 1" to 2" hole diameter. Throughout the entire Nelco line, this same versatility and utility holds true. Other *standard* Nelco carbide tools in stock — saving dollars on special cutters — include

130 Different Side Milling Cutters	40 Different Face Milling Cutters
37 Different Slitting Saws	25 Different Shell End Mills
171 Different End Mills	189 Different Carbide Tipped Drills
21 Different Slab Milling Cutters	

. . . and scores of additional cutters for every application.

SEND TODAY FOR THE NEW NELCO 48 PAGE CATALOG — Whatever your tooling requirements may be — refer to this comprehensive catalog — the tool to do the job is probably stocked by Nelco.

NELCO TOOLS

For that Extra EDGE in Production

NELCO TOOL COMPANY, INC., MANCHESTER, CONNECTICUT

Silicone leather preservative, known as Shoe Saver, has been developed by Dow Corning to keep work shoes and leather equipment soft and pliable despite deteriorating influences. Material is a clear fluid applied with a soft cloth or swab. Product is a water-repellent rather than a waterproofing agent. It is said to increase resistance to flex-abrasion and heat by as much as 50%. Available from safety supply houses in 4-oz bottles (enough for two pairs of shoes) at 60¢; gallons, $12.75.

Dow Corning Corp, Midland, Mich

Reid Teflon Super-Thin V-rings for pumps, valves, and all types of packing have a cross-section as thin as 0.015; added resiliency makes possible tighter seal at lower pressures than previously possible. V-rings permit design of smaller and lighter units by reducing packing gland length and diameter. They are chemically inert, suitable for use in temperatures from – 150 to + 550 F, and have a natural slipperiness that reduces friction.

Reid Enterprises, 3715 Santa Fe Ave, Los Angeles 58, Calif

Super La-Led, free-machining, open hearth, leaded steel bar is available in a wide range of sizes. Said to be the fastest machining steel bar commercially available, it contains about ¼% lead and nearly ½% sulphur. Production tests have shown that product machines 80% faster than standard screw stocks. Because it machines at speeds approaching brass, it has been used to replace it on parts where corrosion is not a factor, and where brass has been used primarily because of machinability. Material is available cold drawn, in rounds, or hexagons.

LaSalle Steel Co, 1412 - 150th St, Hammond, Ind

Steel-frame adjustable factory stools and chairs, made by Pollard Brothers, are now available at stationary model prices. Combination of both riveting and welding is said to produce non-twist and double-strength characteristics.

Pollard Brothers Mfg Co, Chicago

Round-shaped foot-bath tray, with non-slip waffle tread is made of tough rubber, and reportedly will resist inroad of antiseptic solutions. Tray measures 19 in. in dia. by 3½ in. high for shower rooms of any size for use in plants and industry.

General Scientific Equipment Co, 2700 W Huntington St, Philadelphia 32, Pa

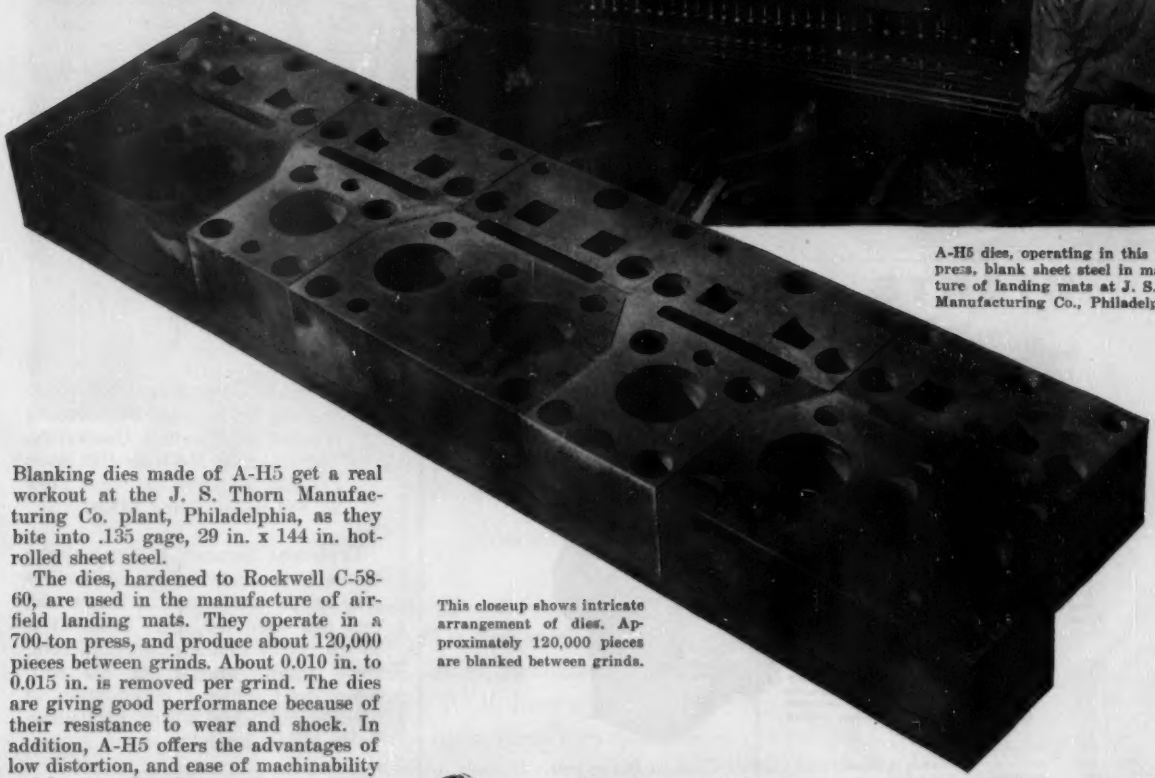
Tool Steel Topics

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

Dies of A-H5 Give Good Service in Turning Out Landing Mats

A-H5 dies, operating in this 700-ton press, blank sheet steel in manufacture of landing mats at J. S. Thorn Manufacturing Co., Philadelphia.



This closeup shows intricate arrangement of dies. Approximately 120,000 pieces are blanked between grinds.

Blanking dies made of A-H5 get a real workout at the J. S. Thorn Manufacturing Co. plant, Philadelphia, as they bite into .135 gage, 29 in. x 144 in. hot-rolled sheet steel.

The dies, hardened to Rockwell C-58-60, are used in the manufacture of airfield landing mats. They operate in a 700-ton press, and produce about 120,000 pieces between grinds. About 0.010 in. to 0.015 in. is removed per grind. The dies are giving good performance because of their resistance to wear and shock. In addition, A-H5 offers the advantages of low distortion, and ease of machinability and heat treatment.

A-H5 is our 5-pct-chrome air-hardening tool steel. It's an easy tool steel to machine, too, as it can be annealed to 212 Brinell.

Typical Analysis

Carbon	1.00	Molybdenum	1.10
Manganese	0.60	Vanadium	0.25
Chromium	5.25		

A-H5 is an economical steel for dies, punches, and forming and blanking tools. It is well liked wherever safe hardening, low distortion and increased resistance to wear are required. Why not give it a trial? Your nearest Bethlehem tool-steel distributor can supply you promptly.

BETHLEHEM TOOL STEEL ENGINEER SAYS:

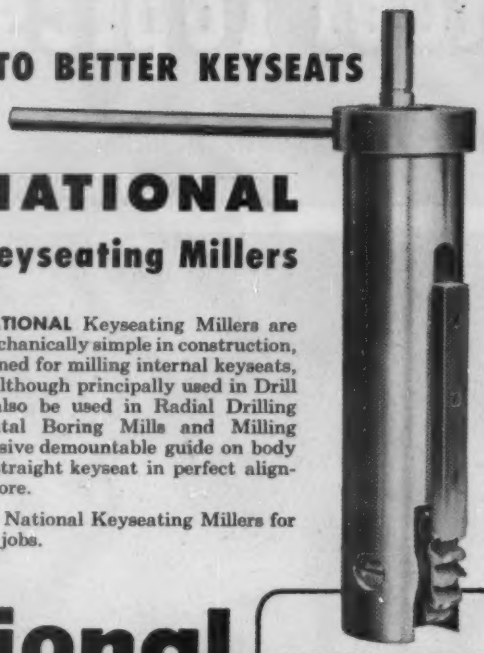
Avoid Premature Failure—Don't Make Shock Tools Too Hard

As a rule, shock-resisting tool steels perform best when they are hardened to Rockwell C-55/C-60. At such a range, there's a good compromise provided between toughness and resistance to wear. When premature failure occurs in these grades, it can usually be traced to excessively high hardness.

But rather than harden shock-resisting steels to Rockwell C-59 or higher, when such hardnesses are required, it would be better to select a carbon tool steel.

When greater wear-resistance is required, the chrome-tungsten grades of shock-resisting tool steel may be carburized to provide a hard case and a shock-resisting core. The carburized case used for this type of shock-resisting steel should be only 0.010 deep. This method can be used to good advantage when you are manufacturing such items as reamers, swaging dies and master hobs.

THE KEY TO BETTER KEYSEATS



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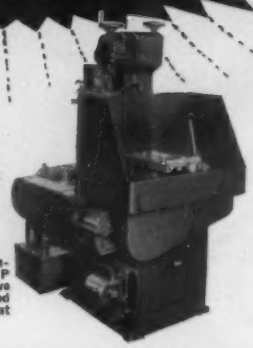

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New Books...

INSTRUCTIONAL UNITS IN MACHINE SHOP—*By Oscar A Embretson and Henry J Seymour, of Wisconsin Vocational Education System. Published by the Bruce Publishing Co, Milwaukee, Wis. 64 pages, 8½ x 11 in. Price, $0.96*

This short book is an outline of various phases of vocational teaching of machine-shop techniques, and gives an instructor a guide, rather than a "manual." Lessons start at simple drilling and tapping jobs, and progress through lathe work, shaper operation, and gear forming, to difficult pieces involving all of these skills.

The book is a "guide" because the lessons do not give any details which a student could follow unaided, but rather tell the materials and tools needed, and the steps to follow. It remains for the instructor to tell what to do at each step of making the tools.

With this limitation, this book could be said to be a handy reference for an instructor, because it answers the question of which tools the student can make which will be useful; and the order in which the tools should be assigned to the students.

•

COLLECTED PAPERS—*Stephen P Timoshenko, Professor of Engineering Mechanics, Stanford University. Published by McGraw-Hill Book Co, 330 W 42nd St, New York 36. 642 pages. Price, $15.00*

Professor Stephen P Timoshenko is one of the outstanding authorities on applied mechanics in the world, and has been for some time. It is to his credit that a publishing company thinks enough of his eminence to publish a compilation of already published works, particularly in so technical a field as mechanics.

Unfortunately, there are few who can read through the book, which is partly in Russian, French, and German, although mainly in English, and give a critical opinion on the material. Technically, the material is excellent—it must obviously have been, or Prof Timoshenko would never have risen to his present importance in the technical world.

It includes his works on mechanics from his earliest up to the present day, and is therefore a history of the

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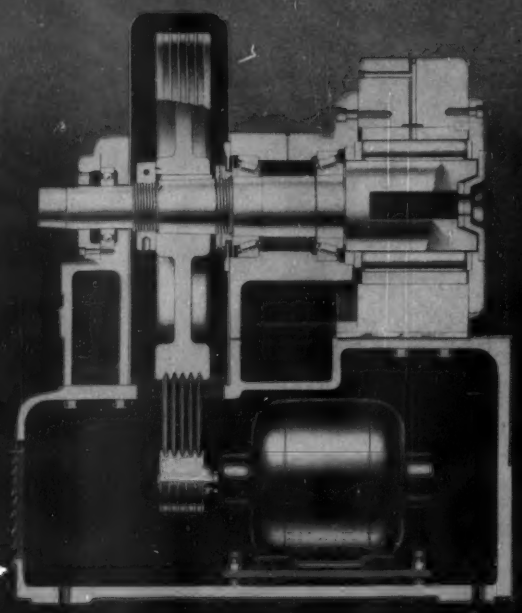

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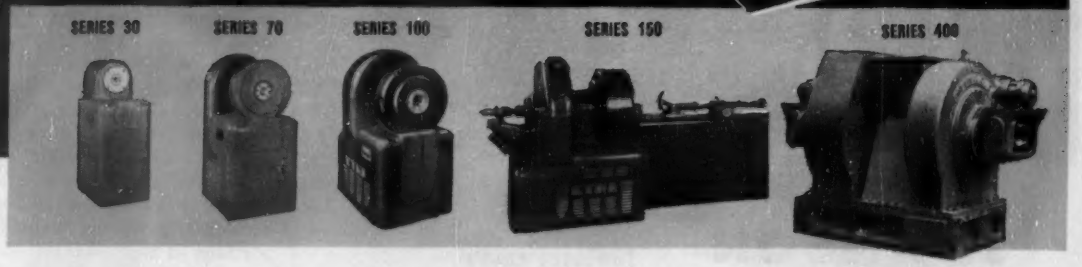

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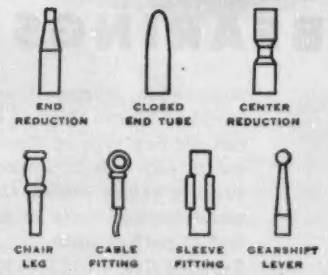

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man and of the science, to some extent. The papers are arranged in chronological order, with the original mistakes included, and with the original footnotes correcting them.

Educationally the material is also excellent, for one interested deeply in the field of mechanics and how it grew.

Literally, the book is a history, but it has no more literary value than any textbook.

The most interesting section, and one worth any engineer's time, is the 15-page biographical sketch in the front which outlines the author's life history through his early training and interest in mechanics, through the Russian revolution, and including his move to America, dabbling in industry, and final shift into academic life.

•

INVOLUTE PROFILE-SHIFTED GEARS—*By Prof Dr Eng T Nakada, Research Laboratory of Precision Machinery, Tokyo Institute of Technology, Oh-Okayama, 1 Meguro-Ku, Tokyo, Japan. Privately printed in English, paper bound, 200 pages. Price unknown.*

Reproduced from typewritten sheets, and including many photographs, diagrams, and tables, this book was printed in 1952 and is widely used in Japan by gear engineers. The term "profile-shifted" is apparently intended as more descriptive than "long- and short-addendum gearing" or "enlarged" or "decreased" gears. When a set of gears is designed with long and short addendums to utilize more favorable portions of the involute curves, the actual shifting of profiles is a secondary concept. It is doubtful whether the author's choice of words is superior to our admittedly awkward expressions.

The book deals with many of the well-known gear systems used in various countries, as well as new material developed by the author. Both British and metric systems are included.

The 21 chapters give the necessary data for calculating gearing of spur, helical, internal, and straight-bevel types. Design problems are used frequently throughout the book to supplement the text. These include enlargement to avoid undercut, gearbox design, planetary and differential arrangements, pump designs, etc. An appendix lists involute functions for 14.5 and 20° PA.

Processes analyzed in detail include hobbing, shaping, and planing

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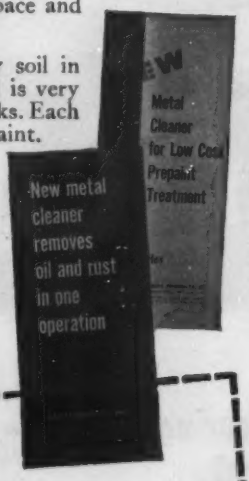

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with rack-shaped tools. Gear measuring equipment is described; measurement over pins and span measurement over two or three teeth being favored. There is even a chapter on redetermination of the basic gear data of a gear removed from service which will enable a shop to make a replacement.

While the book is valuable to gear engineers, rather than to those concerned with production, there is little doubt that the author has made an important contribution to the gear literature. It is most astonishing to find a foreign author who can treat such a highly technical subject as gearing in other than his native tongue.

Reviewed by Granger Davenport.

•

PERSONNEL MANAGEMENT. NEW FIFTH EDITION. — *By Walter Dill Scott, president emeritus, Northwestern University; Robert C Clothier, president emeritus, Rutgers University, and William R Spriegel, dean, College of Business Administration, University of Texas. Published by the McGraw Hill Book Co, 330 W 42nd St, New York 36. 690 pages. Price, $6.50.*

In the 30 years since this book was first published, personnel management has grown from a managerial function restricted to use in a few large firms to widespread adoption in companies both large and small. During this interval the authors have continuously surveyed opinion and practices in all kinds of industries and revised their text accordingly. The present edition seeks to achieve a balance in current thought, based on the assumption that employer and employee, the public and the consumer, all have an interest in equitable wages, satisfactory working conditions, reasonable prices, and profits through service.

The manager and the personnel man in industry can profit from this book, just as much as college students. One feature alone is probably worth the cost because of the trends revealed. This is Appendix *A*. Here are summarized the results of questioning in 1953 a number of companies (628 for this edition) on various practices, and charting the replies against typical conditions in 1930, 1940, 1947. A good percentage of these companies are members of the metalworking industries. Here are some of the findings:

92% of companies now give new employees a personal introduction to their department.

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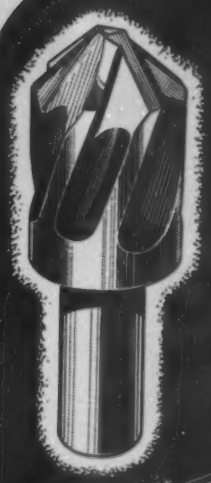

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JF	3/4	1/2	4.60
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In fields of health, safety, and maintenance, managements are currently prone to do more for employees in certain fields, lunchrooms, employee magazines, safety—but less in others —employee's library, legal aid, rental houses, commissaries, recreation rooms.

On the other hand, companies provide more group life insurance, health insurance, stock purchase plans, bonuses, and representation for employees.

A careful study of this book by any manager interested in personnel policies and trends will be worthwhile.

•

WORKING RANGES OF GRINDING MACHINES. *American Standard ASA B5.32—1953. Published by the American Society of Mechanical Engineers, 29 West 39th St., New York 18. Eight pages. Price, $1.*

Simple designations enable the user to identify machine tools and to specify them for reasonably similar size and capacity. This standard covers surface grinders of the reciprocating-table type and plain cylindrical grinders.

•

DRAWING, SKETCHING, AND BLUEPRINT READING—*By Shriver L Coover, State Teachers College, California, Pa, and Chris H Groneman, Agricultural and Mechanical College of Texas. Published by McGraw-Hill Book Co, 330 W 42nd St, New York 36. 377 pages. Price $3.96.*

There is a current educational trend to combine or relate theory with practice. This book follows that trend, developing the subject of simple engineering drafting along with actual examples of shop projects that can be built by the student in a junior or high-school laboratory. Although the text seems elementary and slow-moving as compared with the more standard drafting texts at college level, it is well integrated and written for easy understanding.

It covers drafting from the first stages of projection, through blueprint reading, sketching, working drawings, architectural drawing, graphs and charts, and ends up with a dictionary of shop and drafting terms. Illustrations are good and there are plenty of them.

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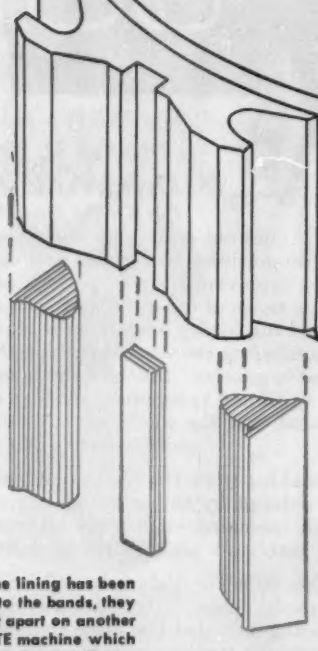

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The BIG ADVANTAGE of the Knight No. 50 lies not only in its ability to do precision boring and drilling, but in its versatility for performing a wide range of other difficult milling and machining operations without transferring the workpiece from one machine to another. Much of the layout work and preliminary drilling are eliminated, and the whole job is finished quicker on the No. 50.

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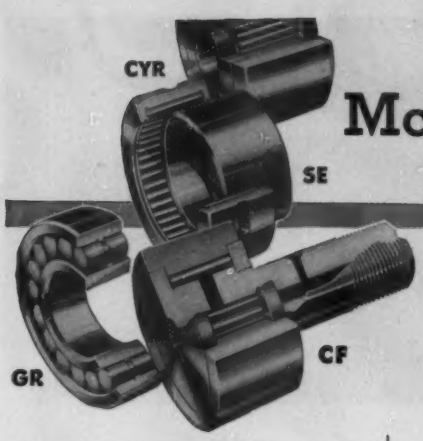

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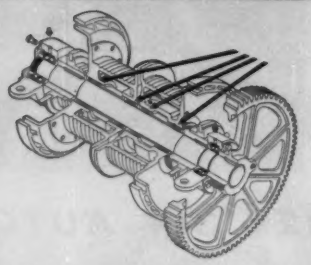

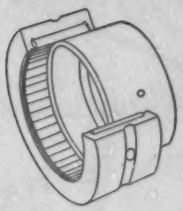

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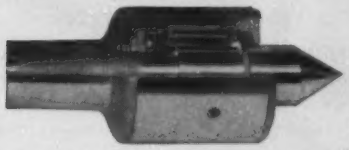

Multirol SE Bearings, press fitted into Motor Tool Live Centers, "account for accuracy and long life of these units." They take the radial loads of lathe, screw machine and grinder operation without radial looseness or play.

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CARRY HEAVIER LOADS MORE ECONOMICALLY
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The heavy cable loads on the Hoist Drum Shaft of Cranes and Shovels require a heavy duty bearing that occupies a minimum of radial space. The Multirol SE Bearing provides the answer to dependable performance in this application. Its trouble-free operation under heavy loads with long life expectancy has effected considerable savings in service charges for users of Lima Cranes, Shovels, Draglines and Pull Shovels.

By packing more load carrying capacity into a smaller radial space, Multirol Bearings permit use of a larger shaft and a heavier drum section. This eliminates the tendency for the crushing load of the cable to bind the shaft and reduces shaft deflection.

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BEARING SELECTION GUIDE
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TRIM MOLDINGS PRODUCED 58% Faster

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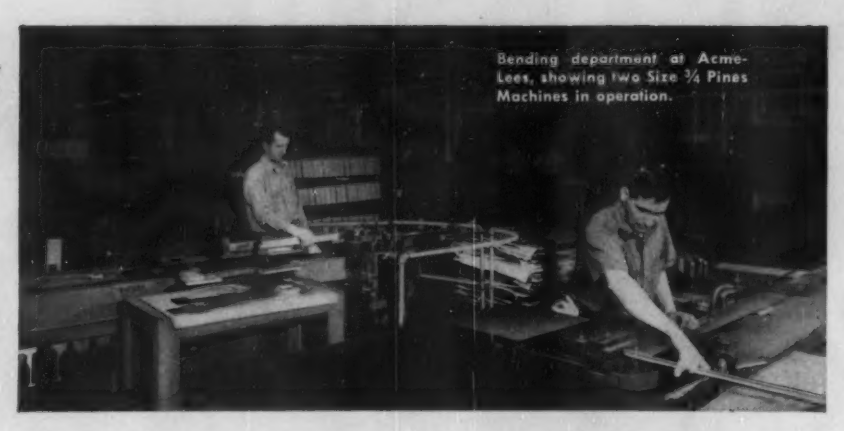

Bending department at Acme-Lees, showing two Size ¾ Pines Machines in operation.

◀ Tooling for compression-bending stainless steel trim strips. First and fourth bends are located from a hinged stop on the swinging arm; second and third, from stops on top of machine.

◀ Tooling for draw-bending brass trim molding to 85° on a 1⅜" radius. Three different sizes of molding are handled with this same tooling by simply adjusting the distance between bends.

SKILLFUL TOOLING PRODUCES SMOOTH 1½" RADIUS BENDS IN .020" TYPE 430 STAINLESS STEEL

Here's a typical result story indicative of the bending skill of Acme-Lees Division, Muncie, Indiana, specialists in fabricating decorative trim moldings and extruded shapes for Appliance and Automotive Manufacturers. On a Size ¾ Pines Automatic Bender, .020" Type 430 stainless steel trim moldings are now formed with four unusually smooth 90° bends to a 1½" radius. Production speed is today 58% faster than by former manual bending methods. Current production is rated at 456 bends per hour as compared to 288 by manual methods.

HYDRAULIC ACTUATION REDUCES SCRAP LOSSES

As shown, the tooling is accurately machined to fit the shape of the delicate molding. A bronze wiper shoe eliminates marring the exterior finish. The operator simply positions the workpiece and starts the hydraulic clamping and bending cycle by push button. The uniform, dependable hydraulic stroke of the Pines Bender assures fast, accurate bends which reduce scrap losses and simplify assembly problems.

INVESTIGATE PRODUCTION BENDING

If you have bending work with tubing, pipe, bars, extruded or rolled shapes, it may pay you to tool for production bending the "Pines-Way". Pines engineers will work with you on any bending problem without obligation.

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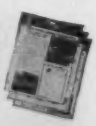
Write for free copies of "Pines News" — illustrate actual bending applications, give details on tooling and cost-cutting production techniques on a wide range of work.



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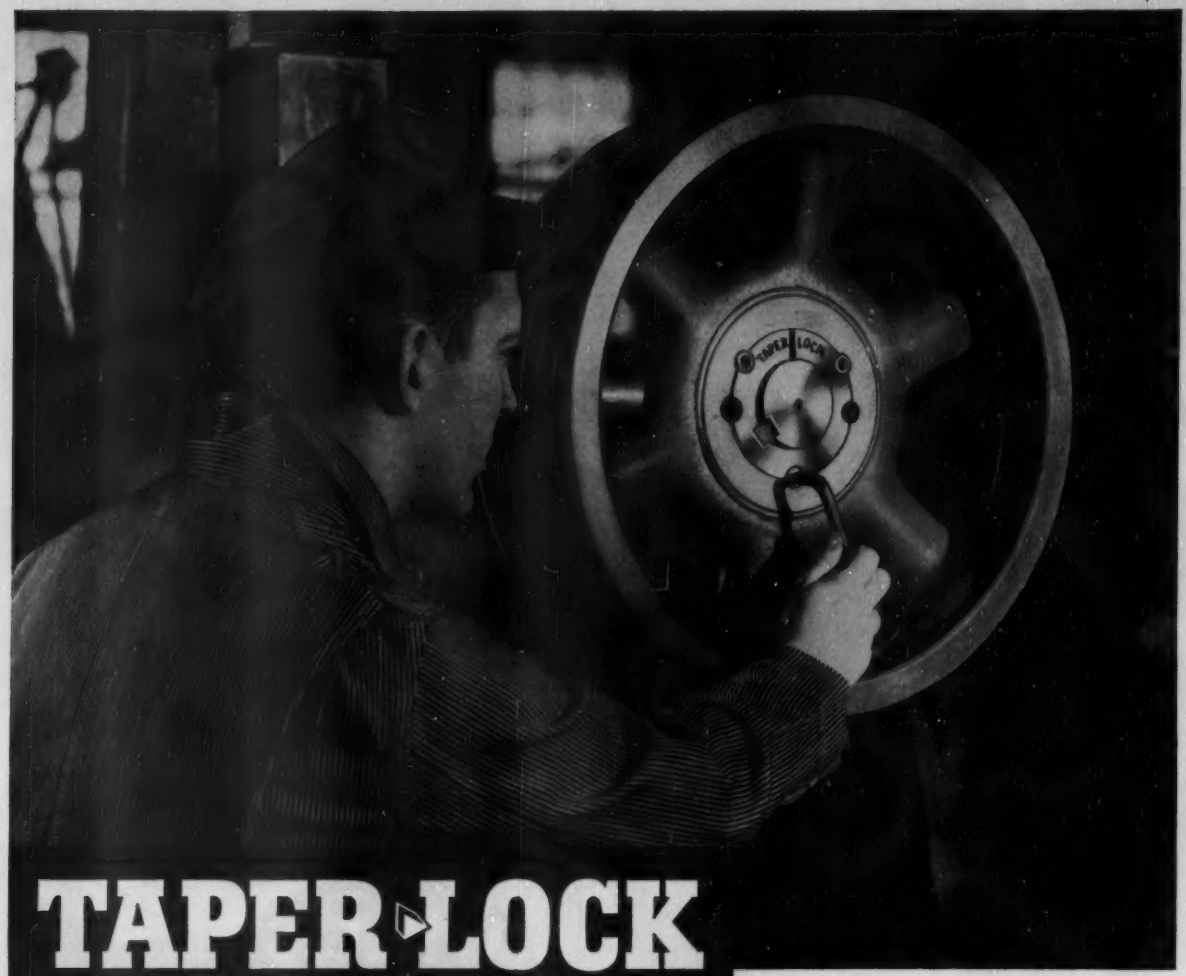

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Slip it on the shaft, line it up and tighten while sighting! Mount sheaves, sprockets, couplings, conveyor pulleys *quicker*—and more easily—with Taper-Lock bushings. A few twists of a hex wrench and Taper-Lock grips the shaft with the firmness of a shrunk-on fit. It comes off as easily, without shock to bearings or machinery. Bushing seats evenly along entire length of the hub—*wheels run true!*

Standardize on Taper-Lock. You save time and money and keep production rolling with these *interchangeable* bushings. See your Dodge Distributor, or write us for the full Taper-Lock story.

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified telephone directory, or write us.

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of Mishawaka, Ind.

DODGE MANUFACTURING CORPORATION, 100 UNION STREET, MISHAWAKA, INDIANA

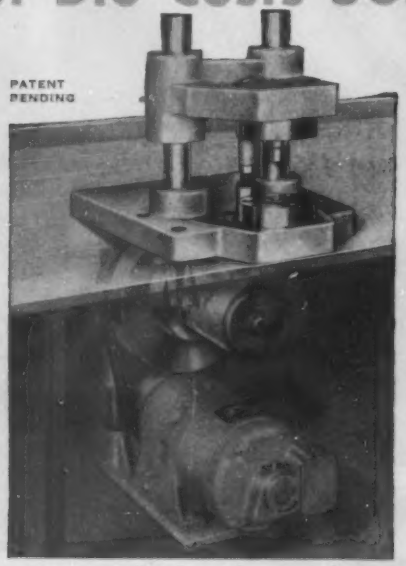
Introducing . . .

the SWANSON

POWER-DI
PRESS UNIT

A precision bench press that makes it possible to:

Cut Die Costs 50%



This new concept in bench punch presses eliminates the use of die sets and reduces die makers' time substantially. The press itself serves as a precision die set, and ready-made punch and die retainers eliminate making special die components. The POWER-DI unit can also be used for existing conventional dies.

Model shown can be mounted to any bench by making suitable opening for self-contained motor and drive assembly attached to lower bolster of press. Exposed working section of press takes little more room than ordinary die set, provides maximum ease of operation and efficiency. Ideal for group bench mounting to handle a series of operations and where working space is a factor. Other models are available for pedestal floor mounting, and also for attaching to Swanson Turret Indexing Units.

POWER-DI units are furnished with 1 ton capacity — 1¼" stroke — 3" to 6" shut height adjustment — 200 strokes per minute.

. . . See these PRECISION PRODUCTS by SWANSON

Turret Indexing Units
Turntable Units
Feeding Hoppers
Memory Devices for automatic machines
V-Liner Inspection Units and Concentricity Checking Fixtures

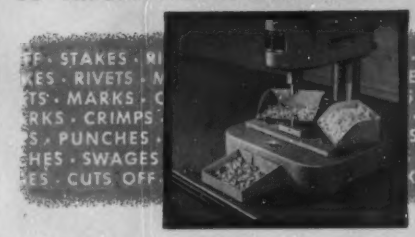
Engineers and Builders of Special precision machinery

Write for Bulletin PD-1

SWANSON
TOOL & MACHINE PRODUCTS INC., ERIE, PA.

Quality since 1919

ELECTROPUNCH stakes terminals to insulators TWICE AS FAST!



In this strict quality control operation at Cambridge Thermionic Corporation, ELECTROPUNCH—the all-electric impact hammer—has slashed production time *and unit cost* in half! Main reason for the speed-up: ELECTROPUNCH delivers instant, controlled impacts at a faster rate than the equipment previously used, and without requiring time to build up pressure! ELECTROPUNCH also *reduced spoilage* resulting from staking these ceramic insulators at inadequate or excessive pressures.

Delivers impacts up to 10,000 lbs. — up to 125 blows per minute! Economical to buy, operate and maintain.

Write, or phone Bigelow 4-6370 for folder showing complete line of Black & Webster tools.

BLACK & WEBSTER, INC.

Dept. 3, 445 Watertown Street, Newton 58, Mass.
Solenoid-operated Production Tools

WILLEY'S TUNGSTEN CARBIDE TOOLS

STANDARD TOOLS

SOLID TUNGSTEN CARBIDE REAMERS

TIPPED TWIST DRILLS

SOLID TUNGSTEN CARBIDE ROUTER BITS

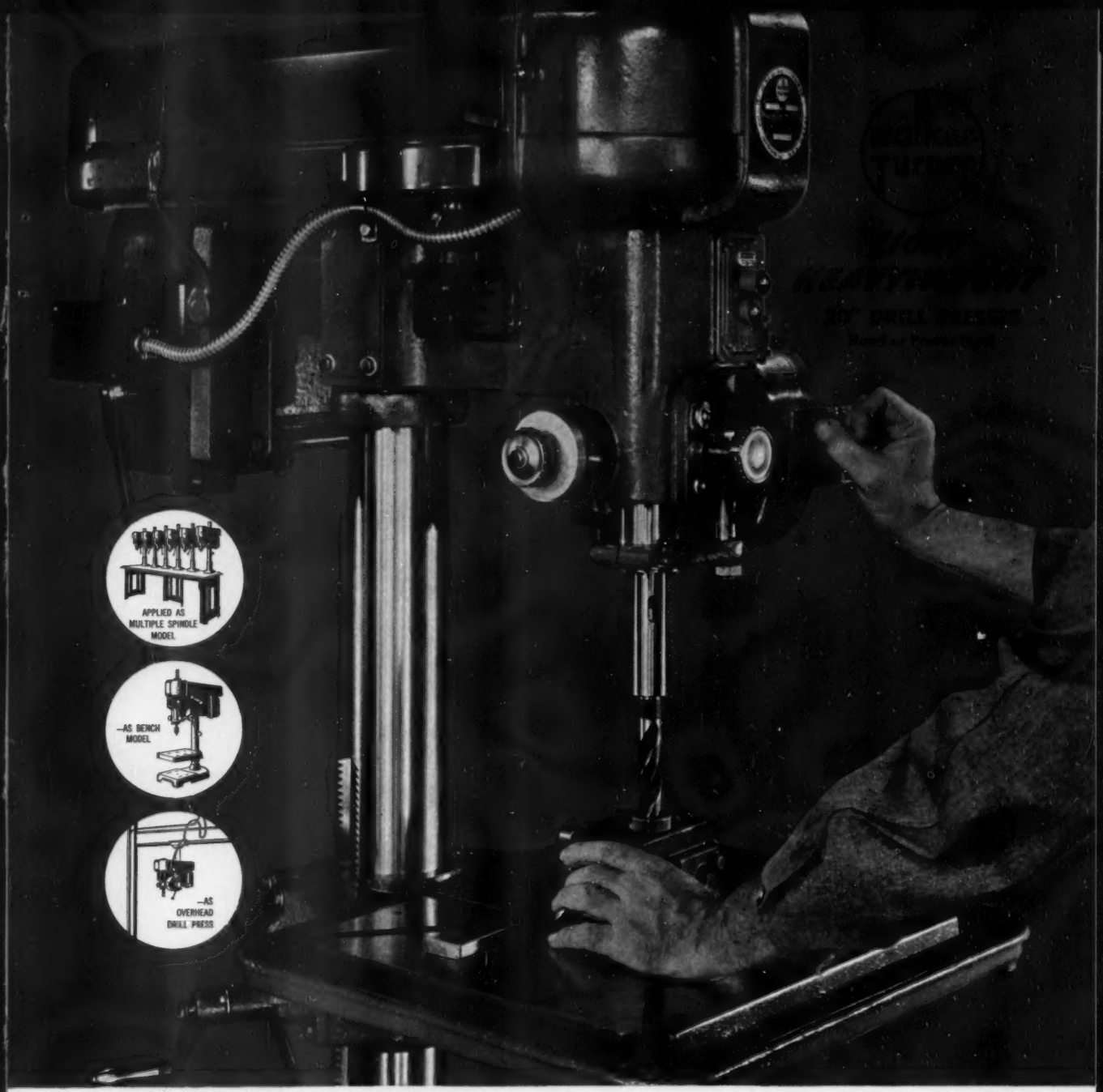
Willey's—The COMPLETE LINE of cutting tools — made complete in our own factories. Hundreds of standard sizes always in stock.

SPECIAL TOOLS

Excellent service on special tools built to your specifications. Send us your prints. You will receive prompt acknowledgement, quotation and delivery date.

WRITE FOR CATALOG

WILLEY'S CARBIDE TOOL CO.
SOLE MAKERS OF WILLEY'S METAL
1342 W. Vernor Highway Detroit 1, Michigan

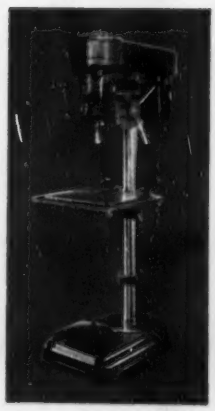


LIGHT-HEAVYWEIGHT Performance Wins New Recognition

The word is getting around about the past performance of Walker-Turner LIGHT-HEAVYWEIGHTS. A newly completed check of leading industries reveals this pertinent fact: *of the 250 largest manufacturers, no less than 93% right now are Walker-Turner users.*

They find in LIGHT-HEAVYWEIGHTS the features and engineering usually available only in large and costly equipment. Take this Walker-Turner 20" Drill Press, for example. It has a heavy, one-piece cast iron head; a 10-spline spindle 1" in diameter; and 4 heavy-duty, precision ball bearings—to name just a few of its fine features that make for top quality...at far from top price.

There's much more to this Walker-Turner LIGHT-HEAVYWEIGHT story that our factory-trained Distributor in your area would like to tell you. You'll find him an expert on industrial equipment, a good man to know. And he's as near as your phone. So why not call him, or write us for his name and more information—today!



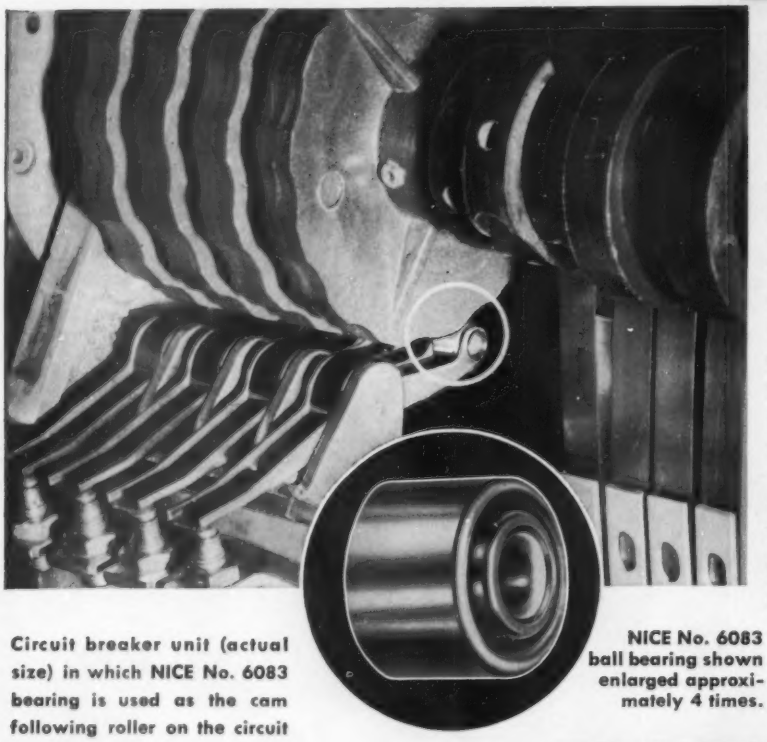
WALKER-TURNER

• DIVISION •

KEARNEY AND TRECKER CORPORATION
PLAINFIELD, N. J.

DRILL PRESSES — Hand and Power Feed • RADIAL DRILLS
Wood and Metal Cutting BAND SAWS • TILTING ARBOR SAWS
RADIAL SAWS • JIG SAWS • LATHES • SPINDLE SHAPERS • JOINTERS
BELT AND DISC SURFACERS • FLEXIBLE SHAFT MACHINES

NICE BALL BEARINGS DO BIG JOB FOR IBM



Circuit breaker unit (actual size) in which NICE No. 6083 bearing is used as the cam following roller on the circuit breaker arm. This unit is typical of those used on IBM Accounting Machines Types 402 and 403 and on IBM Electronic Calculator Type 604. As the name implies, these circuit breakers are used to interrupt electrical circuits intermittently during operation.

NICE No. 6083 ball bearing shown enlarged approximately 4 times.

IBM equipment has gained a worldwide reputation for the speedy solution of problems in computation and the recording and tabulation of records of all kinds. NICE No. 6083 ball bearing is a small but vital part of these IBM Machines. Millions of No. 6083 have been produced to meet the ever expanding use of IBM Machines in industry, commerce and government.

This IBM use of 6083 is typical of many hundreds of similar successful NICE bearing applications, and we invite your investigation of the design and cost saving opportunities the NICE LINE can offer YOU!

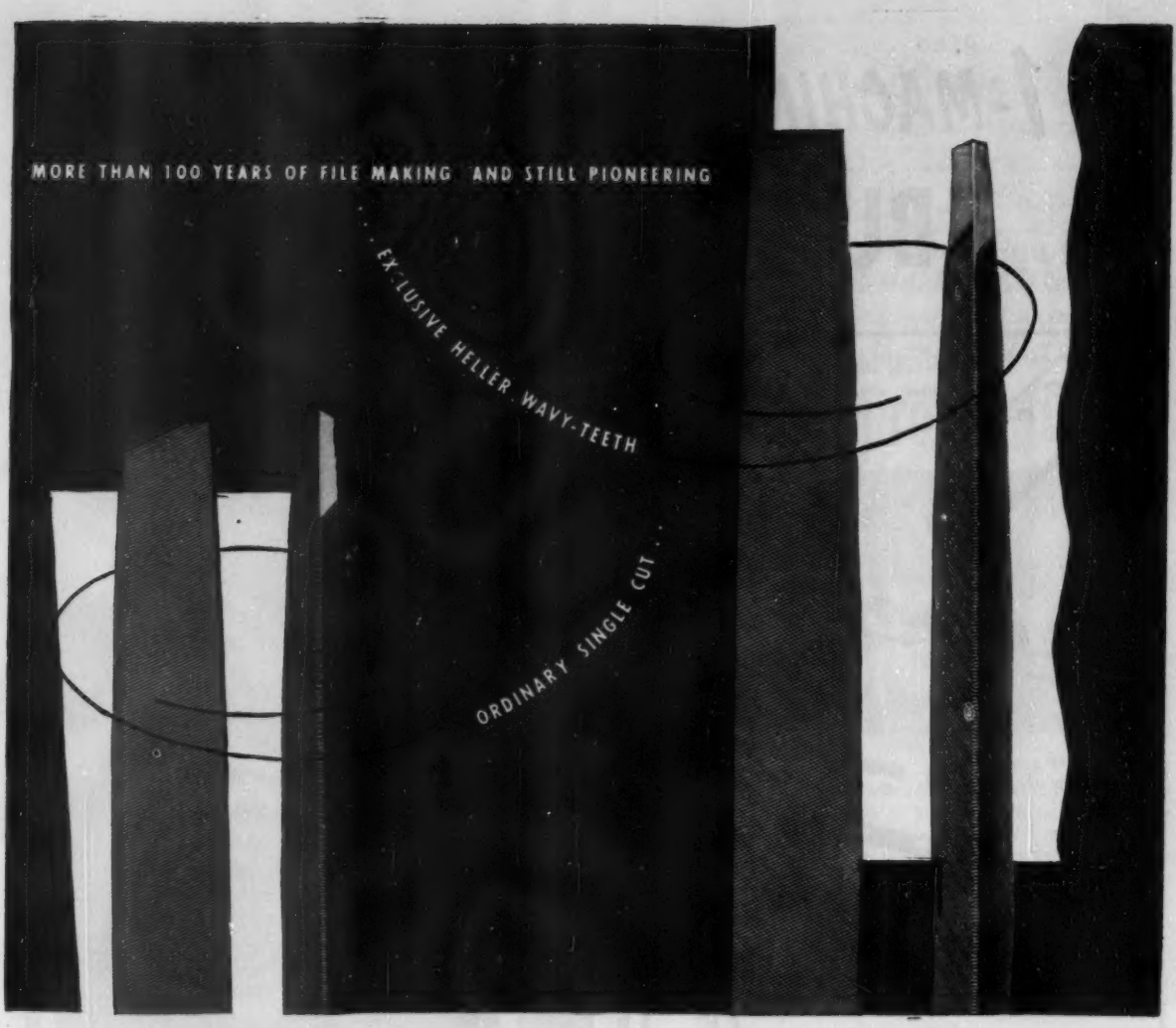
Catalog No. 150 is available upon request. Send for your copy.

IBM Accounting Machine Type 402

IBM Electronic Calculator Type 604

NICE

NICE BALL BEARING COMPANY
NICETOWN · PHILADELPHIA · PENNSYLVANIA



HELLER WAS *FIRST* WITH WAVY-TEETH MILL AND SAW FILES

You can remove more metal faster when you use Wavy-Teeth mill or saw files instead of ordinary single cut mill or saw files. Always specify "Wavy-Teeth" to get this exclusive Heller tooth arrangement . . . a typical development of Heller research. Through a continuous program of inspecting, testing and improving, Heller guarantees file users "the best."

other Heller Firsts

SPIRAL-CUT Half Round Files
NUCUT Wavy-Teeth Files
VIXEN Milled Curved Tooth Files

*Registered T.M.

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American-Swiss
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THESE 3 FAMOUS BRANDS ARE MADE ONLY BY

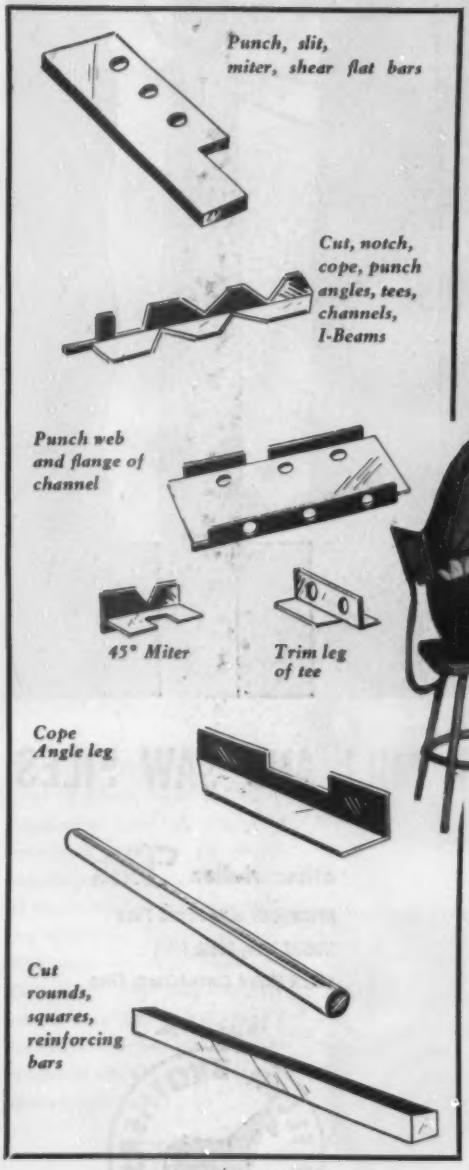
HELLER BROTHERS SINCE 1836

HELLER BROTHERS CO. *America's Oldest File Manufacturer* **NEWCOMERSTOWN, OHIO**

YOUR *HELLER* DISTRIBUTOR CAN SUPPLY ALL YOUR FILE NEEDS

A *1-MACHINE* FABRICATION SHOP!

"BUFFALO" U. I. W.


Punch, slit, miter, shear flat bars
Cut, notch, cope, punch angles, tees, channels, I-Beams
Punch web and flange of channel
45° Miter
Trim leg of tee
Cope Angle leg
Cut rounds, squares, reinforcing bars

CUTS—PUNCHES—SHEARS—SLITS—MITERS your structurals without changing tools!

For fabrication of a wide range of structural members, you'll find a "Buffalo" Universal Iron Worker a regular machine shop! Yet it takes only the space of one machine, and two operators can turn out work simultaneously—at a production clip, one at the punch head, the other at the shear or bar cutting head. Rugged electrically welded steel plate frame, not cast iron. Handy hold-downs. Easy, one-shot centralized lubrication system in most models. 5 models to handle your requirements. WRITE NOW for Engineering Bulletin, stating range of shapes and sizes to be fabricated.

"Buffalo"

BUFFALO FORGE COMPANY

509 Broadway Buffalo, N.Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING PUNCHING SHEARING BENDING

STANDARD ENGINEER'S REPORT

DATA

LUBRICANT: Calol Cutting Oil 39-DA

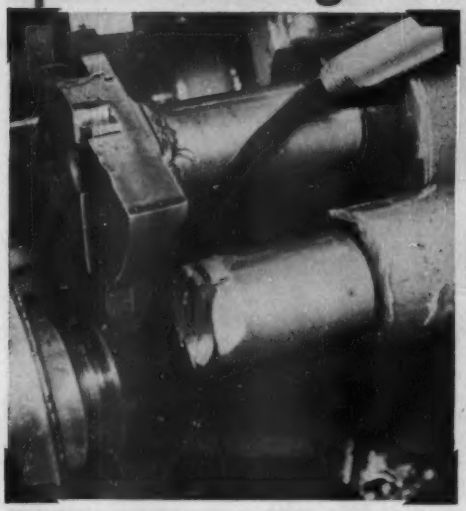
UNIT: Automatic screw machines ½" to 5¼"

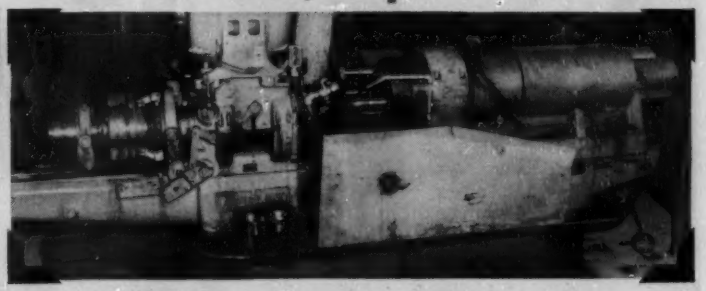
LUBRICATOR: Circulating

SERVICE: Machining spun cast stainless steel

FIRM: Speedway Engineering Co., Montebello, Calif.

Special cutting oil boosts tool life, improves finish!





WHEN CALOL CUTTING OIL 39-DA replaced a competitive oil on this 4½-inch Cleveland Automatic Screw Machine, it greatly increased tool life, improved the finish, and produced the close tolerances required in machining spun cast stainless steel. Tool life on this machine now averages 8 hours. The aircraft flange being worked at left, requires a 100 micro-inch finish and a final tolerance of 0.0015 inch. The Speedway Engineering Company has found Calol Cutting Oils completely uniform and able to handle efficiently any work in their shop.

THE HIGH FINISH OBTAINED with Calol Cutting Oil 39-DA is shown in this comparison photograph. The spun cast stainless steel flange (left) has been rough cut, while the other (right) has had final machining. This shop also uses Calol Cutting Oils on engine and turret lathes, milling machines, and drill presses.

FREE CATALOG: "How to Save Money on Equipment Operation," a handy booklet full of valuable information, is ready for you. Write or ask for your free copy today.

CALOL

TRADEMARK "CALOL" REG. U.S. PAT. OFF.

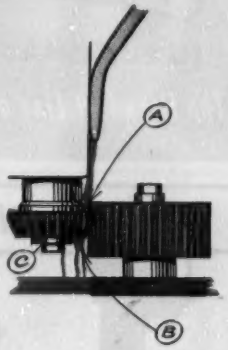
How to increase efficiency in all metal-cutting operations

Use the correct Calol Cutting Fluid for any operation from grinding to broaching. Recommendations for each are made from actual working results.

A. Have high cooling and lubricating qualities—minimize "built-up edge" and promote good finish.

B. Flush away cuttings readily.

C. Protect machine and work against rusting and corrosion.



FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your nearest distributor handling them, write or call any of the companies listed below.

STANDARD OIL COMPANY OF CALIFORNIA
225 Bush Street • San Francisco 20, California

THE CALIFORNIA COMPANY
P. O. Box 780 • Denver 1, Colorado

STANDARD OIL COMPANY OF TEXAS
P. O. Box 862 • El Paso, Texas

MORE SHOPS (than ever before)
ARE STANDARDIZING ON

WILLIAMS
TOOL HOLDERS and SET-UP ACCESSORIES
CARBON STEEL WRENCHES

HERE'S WHY! It's easy, economical and efficient to get the right Williams tools from local Industrial Distributor stocks . . . as needed.

Tool Holders and Set-Up Accessories are correctly designed for fast set-up and precise production performance. Like the wrenches, they are drop-forged from tough quality steel . . . heat-treated for added strength . . . machined to close tolerance finish.

The wide selection meets every production and maintenance need. In wrenches alone, there are nearly 1000 sizes in a variety of patterns.

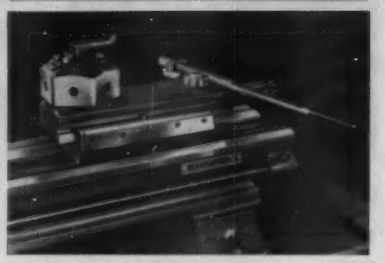
And . . . for cost cutting performance and durability . . . the Williams brand is the "buy" word of industry.

WILLIAMS
INDUSTRIAL TOOLS
"The Broadest Line of Its Kind"

PLUS local service from a Williams Distributor.

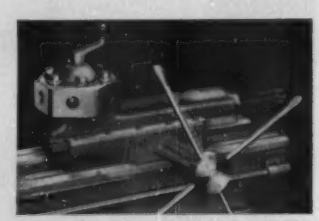
J. H. WILLIAMS & CO.
406 Vulcan Street
Buffalo 7, N. Y.

Simplify
Repetitive Operations with
SOUTH BEND
TURRETS



HANDLEVER BED TURRET
Indexes ± .0005" at 4". Superfinished index pin. Automatic indexing and feed stops. Effective slide feed 4".

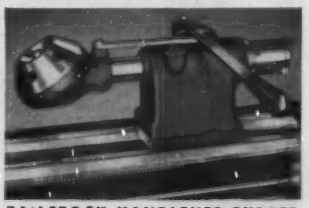
Size Lathe	Catalog No.	Price
9"	CL1611N	$273.
Light Ten	CL1611K	280.
10"	CL1611R	286.
13"	CL1611T	308.



HAND FEED TURNSTILE BED TURRET
Indexes ± .0005" at 4". Automatic indexing and feed stops. 5⅞" feed.

Size Lathe	Catalog No.	Price
16"	CL1917H	$683.

SQUARE TURRET TOOL BLOCK
for Compound Cross Slide
Mounts 4 cutting tools. Turret indexes within .0005" to 4 positions. Quick acting lever lock. For 9" to 16" Lathes — $46 to $91.



TAILSTOCK HANDLEVER TURRET
for 9", 10" and 13" Lathes
Priced as low as $116.

Write for Attachment Bulletin 532! — Shows 165 Attachments and Accessories.

SOUTH BEND LATHE
South Bend 22, Indiana
Building Better Tools Since 1906

The LINLEY JIG BORER

Put your small jig boring jobs on this precision machine

Here's a machine, available at extremely low cost, that will enable you to save your larger machines for larger, heavier work. You'll find it meets your most exacting requirements for precision. Get our accuracy information and you'll see what an outstanding investment this machine represents.

Table movement: 6" x 10"; table size, 7" x 17½".

Send TODAY for complete information

LINLEY BROTHERS CO.
444 STATE ST. EXT., BRIDGEPORT 1, CONN.

THIS, TOM, IS THE RESULT OF

Hanson-Whitney's

CO-ORDINATED RESPONSIBILITY

"We knew this job was difficult. Look at the specifications for thread finish and accuracy. That's why we called on Hanson-Whitney to supply the thread milling machines . . . the thread milling cutters and the thread gages.

"Hanson-Whitney standards gave us the accuracy and free-flow production we needed to get the work out on schedule at a quality level which passed Government inspection at no extra cost.

"That's the kind of performance you get when you call on Hanson-Whitney to solve your threading problems."

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NOTE FROM HANSON-WHITNEY:
When threaded parts, whether thread milled or tapped, reach inspection, you, too, can benefit from "Co-ordinated Responsibility" . . . the true economy and dependability of one source for all of the production elements—precision machine tools, cutting tools, taps and gages.

Your Hanson-Whitney representative is always available for specific recommendations.

HANSON-WHITNEY COMPANY
Division of Whitney Chain Company, Hartford 2, Connecticut, U. S. A.

the HANSON
Threading Processes
Offer Complete
Coordinated
Responsibility
for
The Machine Tools
The Cutting Tools
The Measuring Gages

GRANT

SPECIAL GEARS

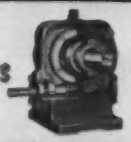
Made to Your Specification

When it's a "Special", with tough specifications, send the job to Grant and you can relax.

The gears will be cut exactly to your specifications and delivered on time to meet your production schedules.

Grant's complete facilities, coupled with more than 75 years of gear "know-how", are your assurance of dependable gears for all requirements.

Specify Grant Speed Reducers



they're quality-built for longer, trouble-free operation. Seven types, each available in several ratios, there is a model to fit your reduction needs. A wide range of types available from stock for prompt delivery!

Whether it's gears, sprockets or speed reducers, you'll find what you need in the new Grant Catalog — just issued.

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GRANT GEAR WORKS INC.

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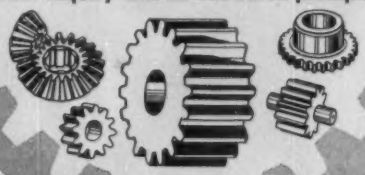
GEARS

of every description— made to your specifications

The gears you buy from E. B. Sewall are made by men who are fussy about specifications. They've got the finest equipment and know how to use it. If you specify .0002" tolerance, you get it—at each tooth on every gear we ship. We're in a brand new plant, equipped to handle your gear requirements. Send specifications and quantity for our quotation.

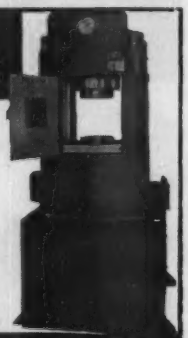
Your inquiry will be answered promptly



SEWALL

E. B. Sewall Mfg. Co., 700 Glendale St., St. Paul 14, Minn.

NEW UNITROL® HOBBING PRESS



Exclusive simplicity of design plus many other exclusive features make Clifton UNITROL® Hobbing presses the number one choice of leading industries. Capacities 100 to 2,000 tons.

For complete details about all types of Clifton Hydraulic Presses and Pumps, write today for our 36-page illustrated catalog.

Illustrated: 600 ton UNITROL® Hobbing Press

CLIFTON HYDRAULIC PRESS CO.
290 ALWOOD ROAD CLIFTON, N.J.

BILGRAM QUALITY GEAR

ALL TYPES • ALL MATERIALS

BILGRAM GEAR & MACHINE WORKS
1217-35 Spring Garden, Philadelphia, Pa.

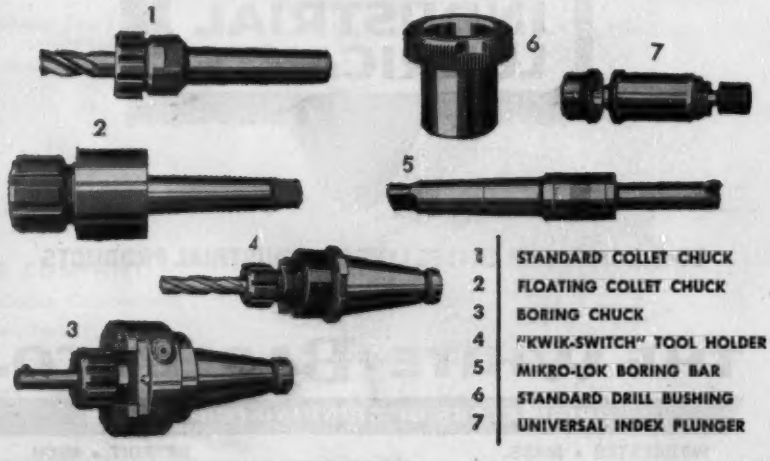
MEET THE CHAMP!

UNIVERSAL DRILL BUSHINGS BEAT ALL RECORDS FOR LONG LIFE AND ACCURACY

The extremely long life of Universal Drill Bushings is due to several factors. They are machined from finest quality steel. Their superfinished bores help to reduce both wear of the bushing and wear of the tools. Blended radius on the top inside diameter helps prevent tool hang-up and breakage. 100% concentricity and hardness tests insure accuracy and uniform quality. Knurled heads provide a quick, sure grip. Available in a complete range of standard sizes and lengths. Orders for special dimensions will receive prompt attention. For complete information, write to the office nearest you—Universal Engineering Sales Co., 1060 Broad St., Newark 2, N. J.; 5035 Sixth Ave., Kenosha, Wis.—or our home office.

179

UNIVERSAL ENGINEERING COMPANY
FRANKENMUTH 1
MICHIGAN



1 STANDARD COLLET CHUCK
2 FLOATING COLLET CHUCK
3 BORING CHUCK
4 "KWIK-SWITCH" TOOL HOLDER
5 MIKRO-LOK BORING BAR
6 STANDARD DRILL BUSHING
7 UNIVERSAL INDEX PLUNGER

A trusted old Friend

TO YOU AND THOUSANDS IN INDUSTRY—SINCE 1895

ECONOMY

THE W&B CO

HAS MEANT TOP QUALITY LUBRICANTS...FOR REASONS EXPLAINED AT THE RIGHT, THEY NOW COME TO YOU

under a New Label!

IN ORDER TO TIE-IN MORE CLOSELY WITH OUR COMPANY NAME—WE HAVE ADOPTED THIS HANDSOME TRADE-MARK

W+B

INDUSTRIAL LUBRICANTS

TO IDENTIFY OUR ENTIRE LINE OF INDUSTRIAL PRODUCTS

THE WHITE+BAGLEY CO.

ORIGINATORS OF GRINDING LUBRICANTS

WORCESTER • MASS. **DETROIT • MICH.**

AN EXPLANATORY NOTE TO OUR FRIENDS AND CUSTOMERS, PRESENT AND FUTURE...

Changing one's name is no light decision, nor is getting used to the new one an easy matter.

Ask any recent bride.

Back in 1895, Herbert P. Bagley, founder of this Company, adopted the trade name "Economy" for industrial lubricants.

In those early days, "Economy" seemed a fine trade-mark and the many industrial lubricants developed and sold by us since then under this brand have become well-known to you and thousands in industry.

Shortly after the turn of the century, we developed the very first water soluble for wet grinding—a paste-form compound. This product, Economy Grinding Lubricant E-1, is still preferred for the highest reflective mirror finish. It is now sold as "W & B Grinding Lubricant E-1."

In the 1930's we developed the original special oils for grinding threads, gears, and other forms. Among these grinding oils is Economy Grinding Oil 1572, which we now call "W & B Grinding Oil 1572."

More recently, fluid type water solubles, like Economy Lubricant 1888 (now "W & B Lubricant 1888"), have been produced for both grinding and cutting operations.

For grinding ferrous metals, perhaps you're familiar with Economy Liquid 1500—the green, transparent coolant, now known as "W & B Grinding Concentrate 1500."

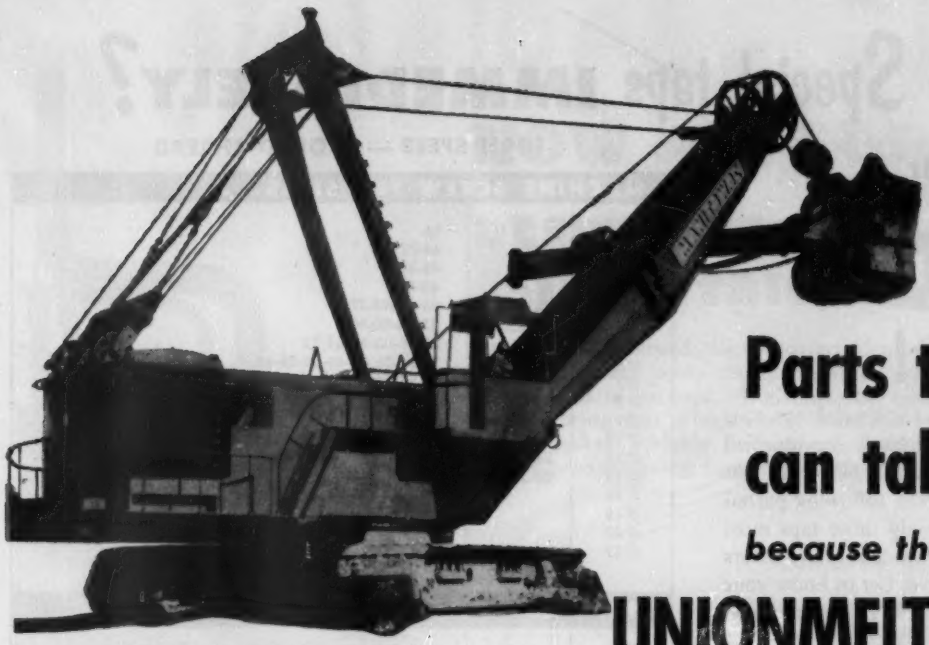
It seems appropriate that the trade name of our industrial products should be more closely identified with our Company name and, with the help of one of America's leading industrial designers, this new trade-mark has been developed.

We trust that "W & B" will mean to you, "White & Bagley—finest industrial lubricants."

You may rest assured that we will continue to make it mean just that.

Edwin J. Bagley

PRESIDENT



Parts that can take it...

because they're UNIONMELT Welded

Dipper sticks have to be strong to absorb severe stresses. That's one reason why the three main sections of this part are UNIONMELT *welded. Sound welds can be made in metal up to 3-in. thick in a single pass.*

A power shovel dipper stick has to be strong. It must withstand severe banging, twisting, and bending stresses as its huge scoop bites out hundreds of tons of earth and rock in each day's operation. But these dipper sticks can take it—they're made by UNIONMELT welding.

Strong, clean UNIONMELT welds can be made in metals up to 3-in. thick in a single pass. There is no limit to the metal thickness that can be joined by multiple passes.

Research and years of experience have helped LINDE to develop a top notch team of fabricating processes—HELIARC, sigma, and UNIONMELT welding. For small shops or huge production lines, from carbon steel to complex alloys—there is a LINDE electric welding process to do the job. Your local LINDE representative will help you determine the best welding process for your job. Call him today for more information.

Linde Trade-Mark

LINDE AIR PRODUCTS COMPANY
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
Offices in Other Principal Cities
In Canada: DOMINION OXYGEN COMPANY
Division of Union Carbide Canada Limited, Toronto

"Heliarc," "Unionmelt," and "Linde" are registered trade-marks of Union Carbide and Carbon Corporation.

NEED Special taps IMMEDIATELY?

Call **R/N** first!

Your needs for special taps can, most likely, be supplied immediately from R & N's very large stock. The following partial list includes only those taps most frequently needed. Many others are also available. Let us know your requirements. Telephone now.

telephone:
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Specialists in tap manufacture, with emphasis on service, R & N takes a personal interest in your tap requirements. Whether your need is for standard or special taps, for assistance in engineering or design, the facilities and experience of R & N are at your service.

HIGH SPEED — GROUND THREAD

MACHINE SCREW TAP SIZES...

#00		96
#0	80	64-72
#1	64-72	48-56
#2	56-64	48-80
#3	48-56	36-40-44-52
#4	36-40-48	32-56-80-90
#5	40-44	32-36-48-60-64-72
#6	32-40	24-30-36-44-48-50-56-64
#7		30-32-36-40-44-48-64
#8	32-36	30-40-56-60
#9		24-30-32-36-40
#10	24-32	28-30-36-40-48-60
#12	24-28	20-32-36-40-48-56-60
#14	20-24	18-28-32-40
#16		18-20-22-28-32-36
#18		18-20-32-36
#20		16-18-20-32
#22		14-16-18

HAND TAP SIZES...

1/4	20-28	8-18-22-24-27-30-32-33-36-40-42-48-50-56-60-72-80
5/16	18-24	12-14-16-20-22-27-29-30-32-36-40-44-48-56-72
3/8	16-24	9-12-14-18-20-26-27-28-32-36-40-46-48
7/16	14-20	12-16-24-27-28-30-32-40
1/2	13-20	10-11-12-14-16-18-24-27-28-30-32-36-40
9/16	12-18	14-16-20-24-27-28-30-37
5/8	11-18	10-12-14-16-20-24-27-28-32-36-40-48
3/4	10-16	12-14-20-24-27-28-30-32-40
13/16		10-12-14-16-20-24-28-32
7/8	9-14	8-10-12-13-16-18-20-28-40
1	8-14	7-10-11-12-16-18-20-24-27-32
1 1/16		12-14-16-18-20-32
1 1/8	7-12	8-16-20-24-28-32
1 3/16		10-12-14-18-20
1 1/4	7-12	8-10-14-16-18-20-24
1 5/16		12-14-16-24-26-32-36-40
1 3/8	6-12	8-10-14-16-18-20
1 7/16		8-12-14-16-18-20-24
1 1/2	6-12	5-8-10-13-14-16
1 9/16		6-12-18-20-32
1 5/8		5 1/2-8-10-12-14-16-18-20-24-36
1 3/4		8-10-12-16-18
1 13/16		10-16-20-32-40
1 7/8		5-8-10-11-12-14
1 15/16		8-11-14-16-20
2		6-8-10-12-14-16-18-20
1/16		64-72
3/32		48-50-80
1/8		32-40-44-48
5/32		24-28-32-36-40-48
3/16		24-28-32-36-40
7/32		24-28-30-32-36-40
9/32		20-28-31-32-40
11/32		20-24-28-32-40-48
13/32		16-18-32

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REPRESENTATIVES IN PRINCIPAL CITIES

NOW WE FORGE IT

DESPITE ITS LARGE SIZE AND INTRICATE SHAPE

The CAMERON closed die extrusion forging process opens the door to a great many design features which heretofore had been limited to castings. The improved quality and the lower manufacturing cost which result from machining a CAMERON forging makes it highly desirable to investigate the possibility of your product being forged at CAMERON.

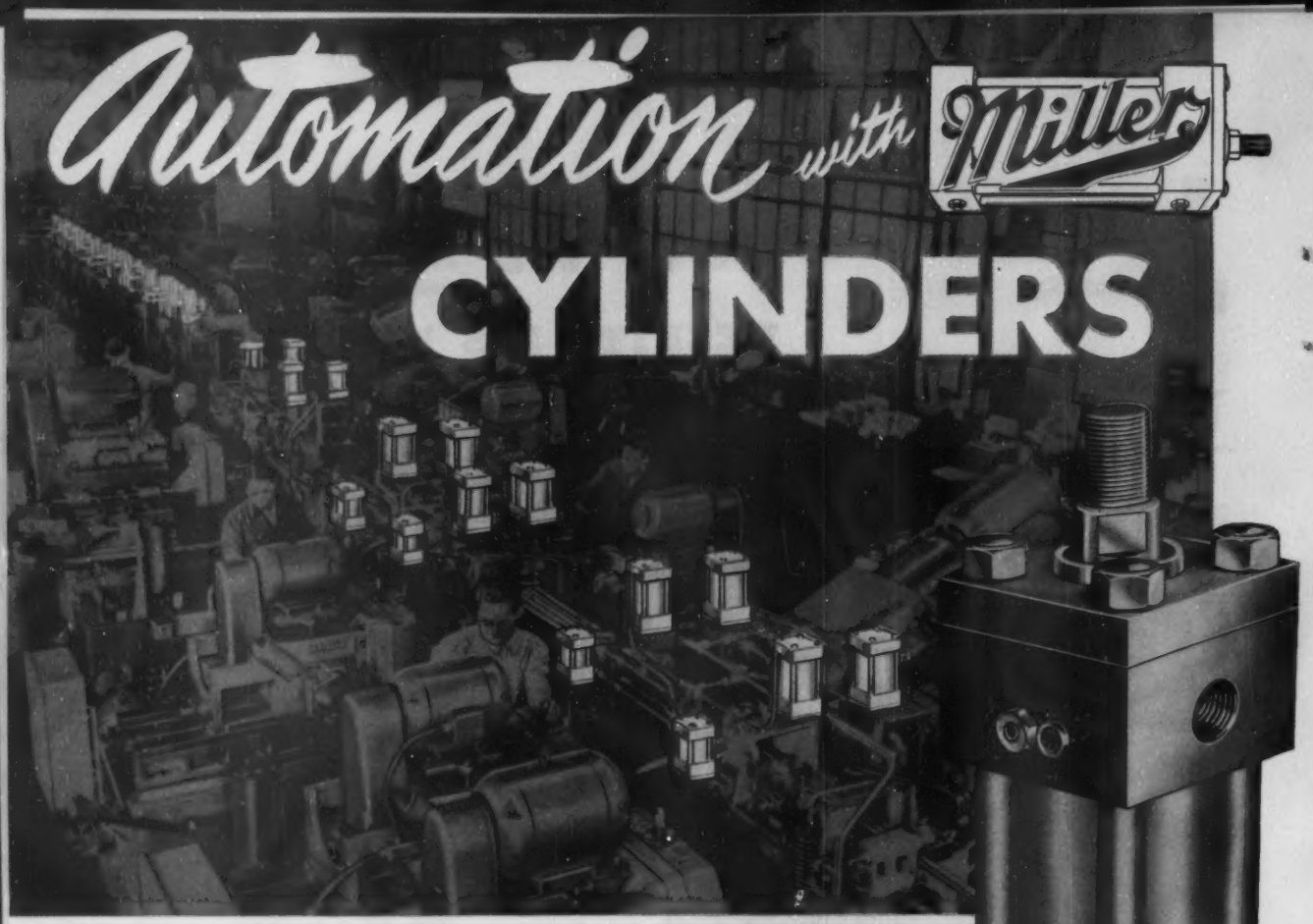
For further information write

FORGE AND ORDNANCE DIVISION

Cameron

IRON WORKS, INC.
HOUSTON, TEXAS

Automation with Miller CYLINDERS



...assures non-stop production flow with BIG savings in maintenance and investment cost!

The production magic of "AUTOMATION" demands faultless performance—as the failure of one important component of "automation" machinery and equipment can shut down an entire manufacturing process.

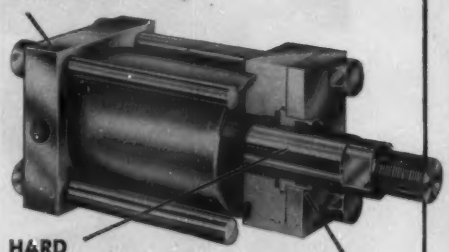
In the "automation" application illustrated above, 22 Standard Miller High Pressure Hydraulic Cylinders are employed on each of two identical automotive transfer machines built by Ex-Cell-O Corp. of Detroit, Michigan, a recognized leader in the design and manufacture of "automation" equipment.

The machines perform—simultaneously and automatically—drilling, countersinking, counterboring, and tapping operations on automotive cylinder heads. And the Miller Cylinders accomplish the vital clamping, feeding, holding, rotating and locating operations that enable the machines to function as smooth "automation" production units.

Miller Cylinders are ideal for such "automation" applications. They withstand severest shock loads, provide millions of smooth strokes without repacking of seals or other maintenance. Their space-saving square design cuts installation and designing costs. They're available in an infinite variety of versatile power and stroke units that cover every need and permit the most economical choice for the application. And they fully meet the J.I.C. Standards.

Consult our engineering department or local representative. And write for complete information on this and other interesting applications and for our FREE Cylinder Bulletins A-105 and H-104.

SOLID STEEL HEADS, CAPS and MOUNTINGS Eliminate Breakage



HARD CHROME PLATED PISTON RODS Prevent Scratch-Damage, Nicks and Rust

DIRT WIPER SEALS Protect Rods, Seals, Bushings

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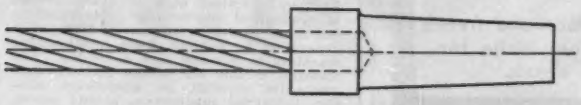
Miller

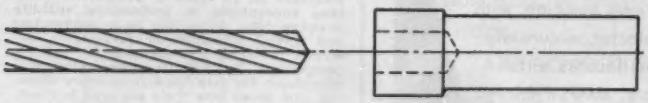
MILLER FLUID POWER CO.

2004 N. Hawthorne Ave., Melrose Park, Ill.

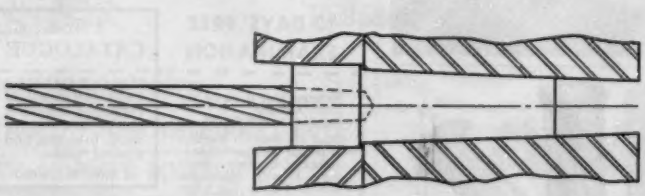
Cable Swaging... Clean, Quick, Economical



An electrical equipment manufacturer wanted a way to fasten terminals to cables—a way that would give perfect bonding—a way that was cleaner and faster than soldering or brazing.



Torrington's swaging experts showed him how to attach terminals to cables by one fast rotary swage.



Result: a clean, secure joint between cable and terminal, and accurate sizing of the plug end of the terminal at the same time.

Look at the savings that swaging can bring!

1. Savings in material and equipment—no solder, no brazing or dipping equipment needed.

2. Savings in labor—swaging can be done by unskilled personnel.

3. Savings in time—swaging is fast, clean and precise.

For more information on swaging as a method of bonding or reducing metals write for our informative booklet. It contains complete descriptions of the Torrington Rotary Swagers and may give you some ideas for a "swaging success story" in your own plant.

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Swager Department
222 North Street, Torrington, Conn.
Makers of Torrington Needle Bearings

TORRINGTON ROTARY SWAGING MACHINES

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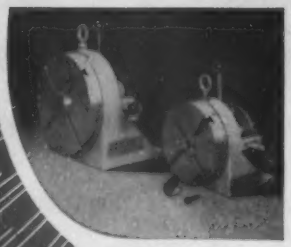

2. RAPID, ACCURATE JIG POSITIONING

This indexing trunnion, with station selector, accurately holds and locates either jig or work. SIMPLIFIES JIGS. REDUCES SET-UP TIME.

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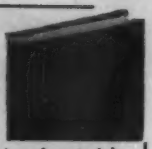

Shows how to handle all commonly used methods of calculation of load-carrying capacity of gears, proper geometric proportioning of parts, choice of materials, sizing of parts for manufacturing process, consideration of service conditions, and kinds and causes of failure. Gives many equations, curve sheets, and tables to aid in design of commonly used types of gears. **By Darle W. Dudley, Supervisor—Gear Advance and Development Engineering, General Electric Co., 352 pages, 165 illus. $7.00**

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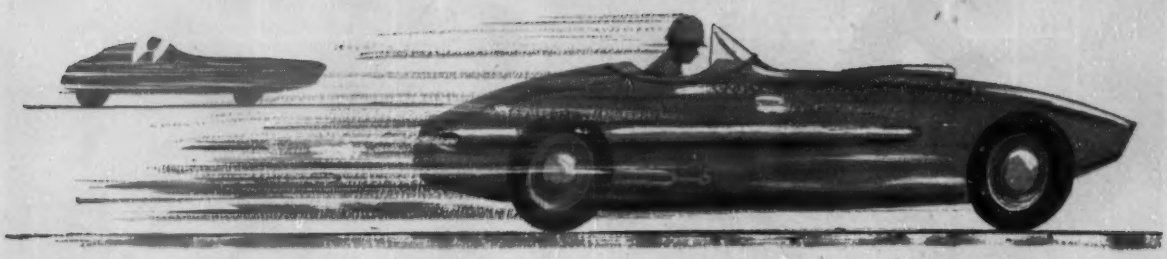

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Like racing cars, metal cutting machinery and tools are built for higher speeds today than ever before. But to get all the metal cutting speed your equipment can give, you need a modern, high-speed coolant—Antisep A. P. Base!

Antisep is a heavy-duty, fortified cutting base—soluble in water—that has greater lubricity and carries away heat faster than any cutting fluid you can match against it. It has excellent anti-welding properties and is treated to eliminate rancidity and odor.

Take advantage of the profitable production speed of your machines by using Antisep. For a trial production run in your own shop, call your Houghton Man or write E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

MACHINING SPEED RAISED FROM ONE PART EVERY SIX MINUTES TO ONE PART EVERY 3.16 MINUTES!

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SPECIAL TOOLS • UNITS FOR MACHINE TOOLS

test all type gears on a single machine...

KLINGELNBERG model PZ 375

Both *cumulative* and *individual* errors on all types of gears can be tested and recorded on the sensitive Klingelnberg PZ 375 Universal Gear Tester. The machine is adaptable both to the two flank rolling test *and* to quick, accurate single flank testing.

TESTS ALL THESE GEARS—Spur, helical and bevel gears, worms and worm gears, racks and hobs, internal gears—with appropriate attachments.

RECORDS THESE ERRORS—Center distances, tooth profiles, base circles, pressure angle and base pitch of straight spur and helical gears; circular pitch of gears and hobs; spacing and pitch of worms and hobs; angle of tooth and base spiral angle of helical gears.

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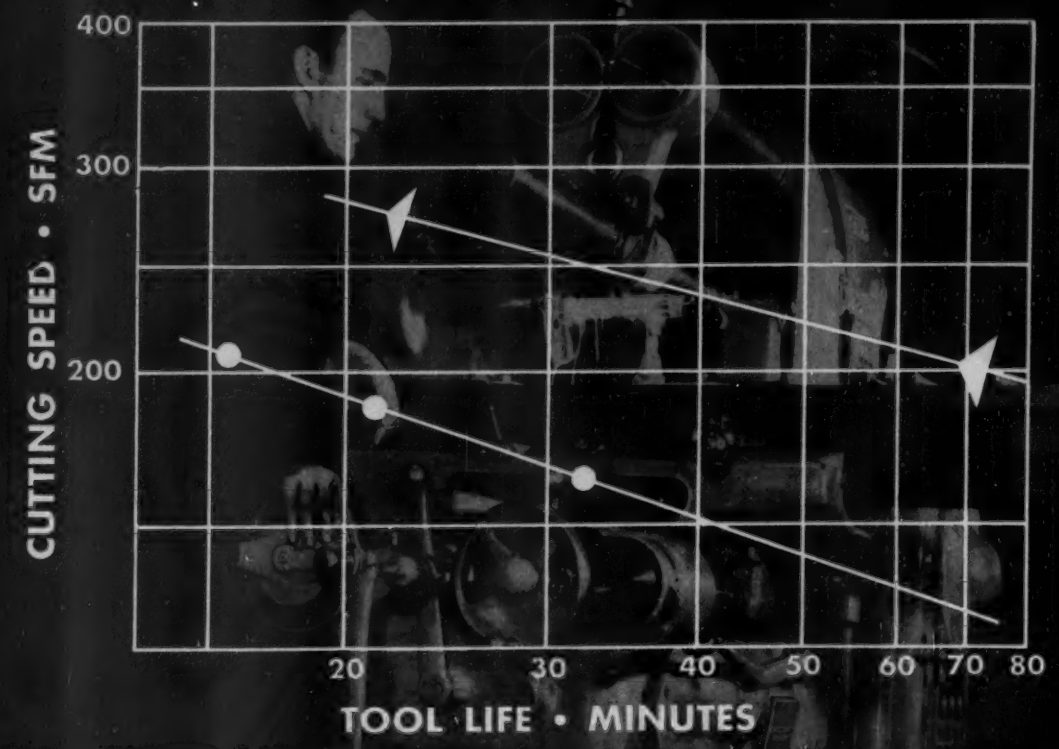
WHY IT PAYS TO BUY USS CARILLOY FC STEEL



50% FASTER MACHINING! 5 TIMES LONGER TOOL LIFE!

● These curves prove the excellent machinability of CARILLOY FC steel. They were obtained from an actual machining test on a Constant Pressure Test Lathe.

Samples of CARILLOY FC steel and of the AISI 4100 series of comparable hardness levels were quenched and tempered to 285 BHN. Identical tools were then used to machine both samples.

When the same cutting speed was used, tool life was five times longer on CARILLOY FC steel than on the 4100 series of the same hardness. When cutting speeds were adjusted to give the same tool life, the CARILLOY FC sample could be machined 50% faster. In actual production, this easier cutting materially reduces production costs.

One manufacturer reports that a changeover to CARILLOY FC steel cut his costs 12%. Another reports a saving of 25%. Wherever it has been used—in shafts, pinions, gears, axles, and other heavy-duty parts that require a lot of machining—CARILLOY FC has consistently cut costs.

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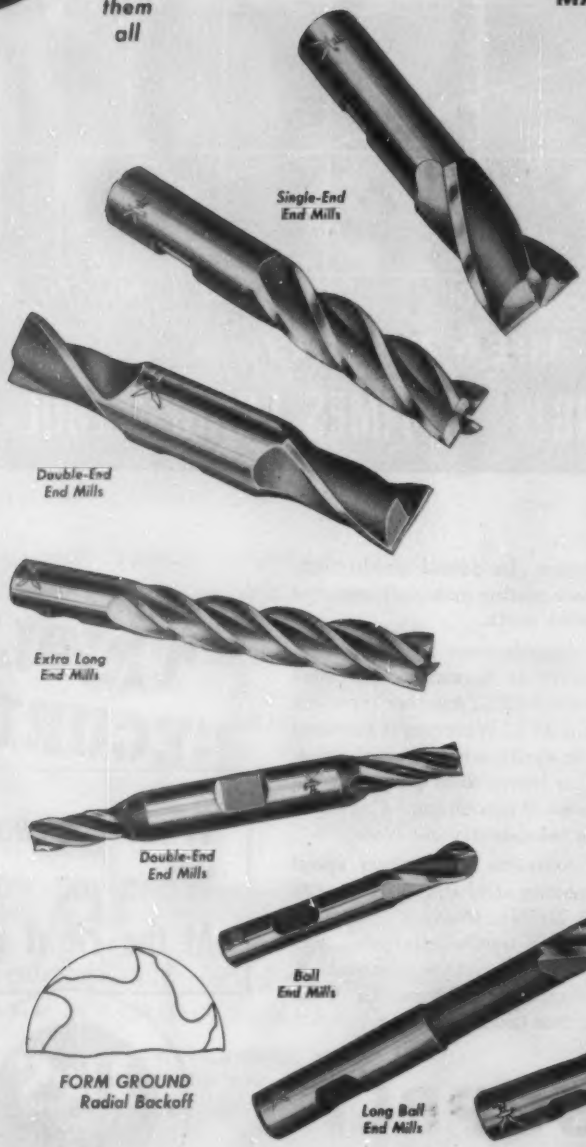

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FOR HIGHER EFFICIENCY

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Falcon's is not just another End Mill—it is Radial Form Ground—cutting clearance is always constant—never changes thruout the life of the Mill.

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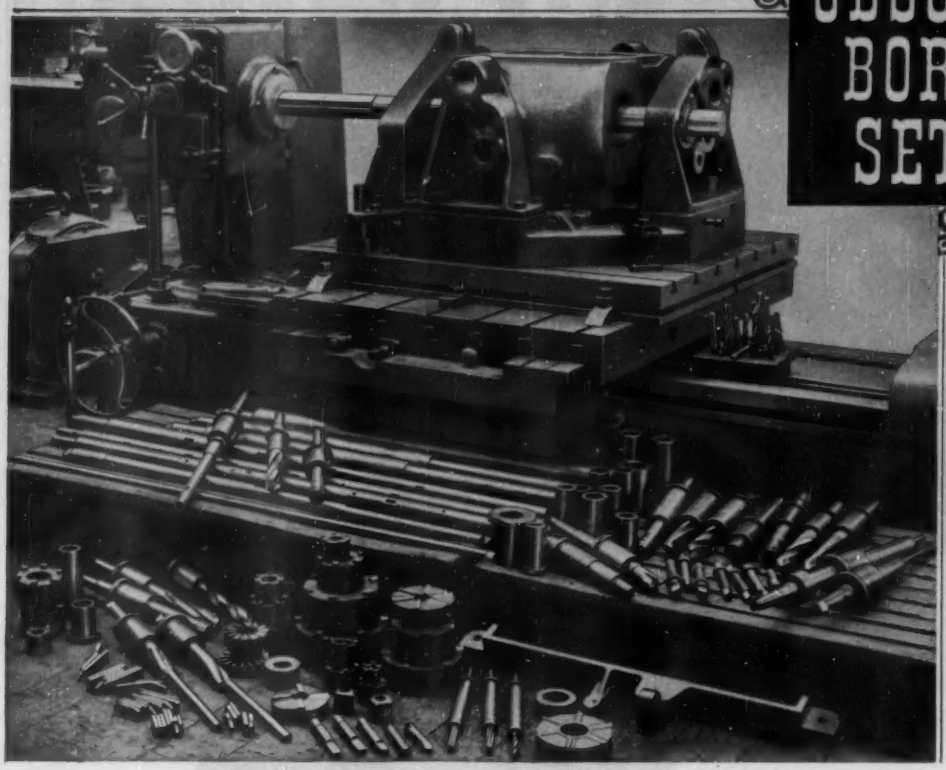
OBSOLETE BORING SETUP!



THIS PICTURE— taken in a well known machine tool plant illustrates the old method of boring turret lathe headstocks with a costly inflexible box jig and a mass of special tooling

The Modern Method

"JIGLESS BORING" THE SAME PIECE ON A DE VLIEG JIGMIL

- Eliminated expensive boring jig
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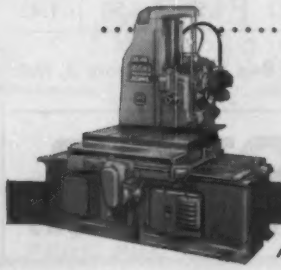
If your shop is burdened with costly boring jigs and special tooling, it will pay you to investigate the DE VLIEG SPIRAMATIC JIGMIL!



Come to Detroit... see a practical demonstration of the JIGMIL Technique . . .

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Gerotor has redesigned its series of small capacity pumps to give even more . . .

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- **DEPENDABLE SERVICE**—the QDB is built to give more dependable service over a longer service span than any comparable pump. Its longer life reduces your maintenance and replacement costs.

If you have need for pumps in the QDB range, call on Gerotor.

Gerotor makes a complete line of hydraulic pumps in ranges from .4 g.p.m. to 40 g.p.m. The Gerotor engineers can help you solve your hydraulic pump problems. Write for *free literature* and full particulars.

Check this capacity table . . .

Type	Delivery g.p.m.—1800 r.p.m. Discharge Pressure p.s.i.				
	0	250	500	750	1000
QDB .4	.42	.40	.38	.35	.31
QDB .75	.84	.80	.78	.73	.66
QDB 1.5	1.67	1.62	1.57	1.50	1.42

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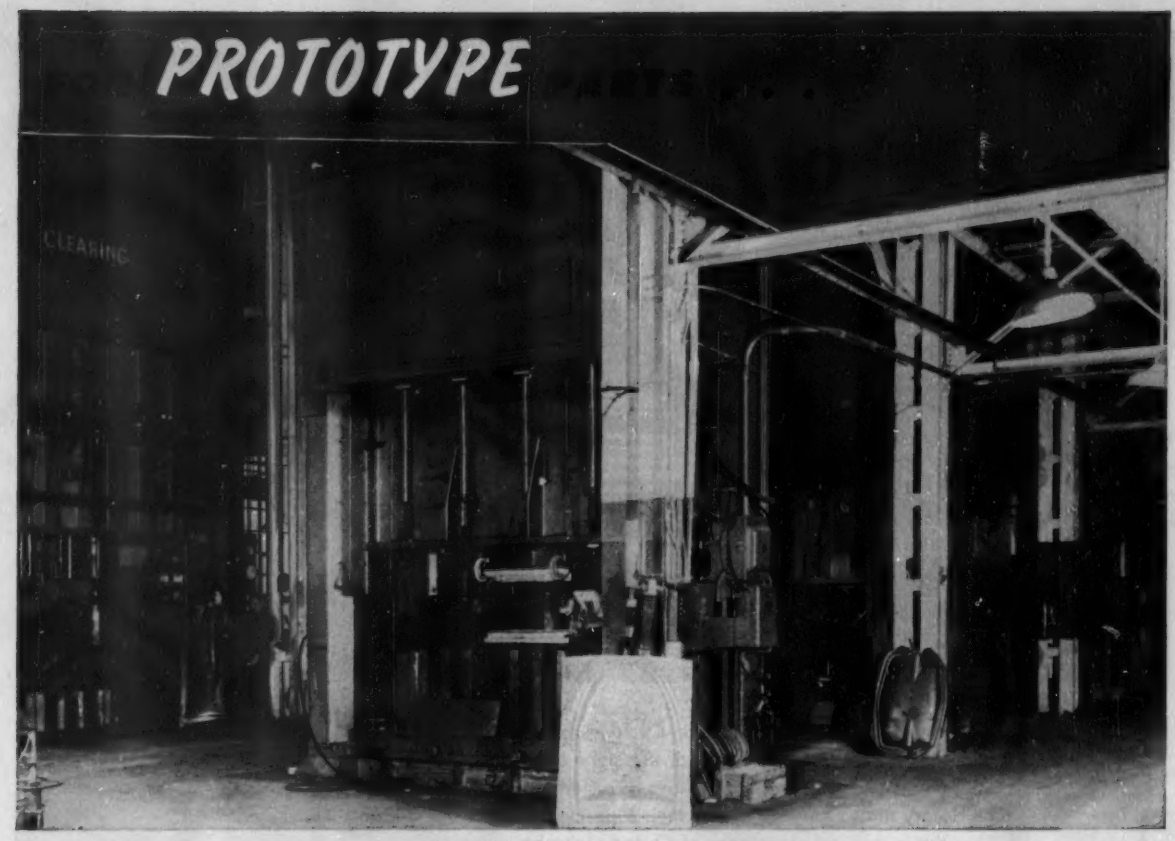

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PLANT 2
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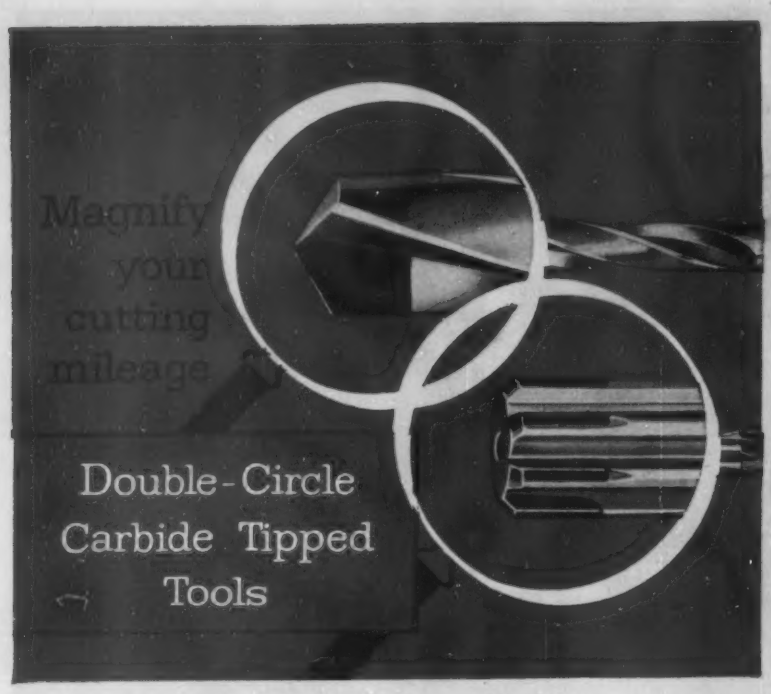
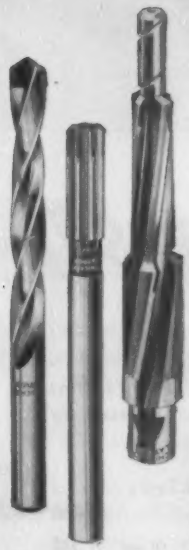
PLANT 3
Hillsdale, Mich.

PLANT 4
Hillsdale, Mich.





An enlarged view of Double-Circle carbide inserts can only give you a minor part of the story of their cutting magic. These splendid tools have a "beneath-the-surface" story that is the true key to their superiority. In a word, this is the vast *experience* of Chicago-Latrobe in cutting tool engineering, in selection and testing of materials and in precision manufacturing methods. It is not surprising that wise buyers everywhere look to Chicago-Latrobe's complete line for the tools that make cutting operations faster, smoother, easier. For greater cutting mileage, always specify Double-Circle carbide tipped drills and reamers.

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need information on

milling machines?

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These manufacturers' catalogs are instantly available in Section 2 of your Machine Tool Catalogs:

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Giddings & Lewis Machine Tool Co.	Knight, W. B., Machinery Co.
Greaves Machine Tool Co.	Motch & Merryweather Machinery Co.
Hall Planetary Co.	Rowbottom Machine Co.
Innocenti	Sundstrand Machine Tool Co.

***ALSO:* The following catalogs, in other sections of your Machine Tool Catalogs, contain information on milling machinery:**

Armstrong-Blum Mfg. Co.	Landis Tool Co.
Armstrong Bros. Tool Co.	Motch & Merryweather Machinery Co.
Besly-Welles Corp.	Norton Co.
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Consolidated Machine Tool Corp.	Reid Bros. Co., Inc.
Davis Engine Co.	Rivett Lathe & Grinder, Inc.
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General Mfg. Co.	Sheldon Machine Co. Inc.
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Gisholt Machine Co.	Taft-Peirce Mfg. Co.
Greenlee Bros. & Co.	Thomas Machine Mfg. Co.
Johnson Machine & Press Corp.	Verson Allsteel Press Co.
L & J Press Corp.	Wales-Strippit Corp.

In other sections of the File you will find additional catalogs containing useful information on a wide range of machine tools and accessories.

Sweet's Catalog Service

Division of
F. W. Dodge Corporation
119 West 40th Street, New York 18, N. Y.

From the *American Machinist* Library of *Tips for Top Shop Men*

BE SURE in your own mind why you refuse to consider a new method, a new machine, or a new man. Are you envious because you didn't think of the method, or are you too lazy to work out the change? Are you enamored of an ancient clonker, or are you afraid to meet present standards? Are you jealous of the new man, envious of his youth or experience, fearful of your job?

Choice of leading physicians is this motor-elevated medical specialists table made by Ritter Company. To minimize the discomfort of patients its tilting mechanism is Aetna bearing-equipped for effortless, smooth, quick adjustments without irritating jolting and jarring.

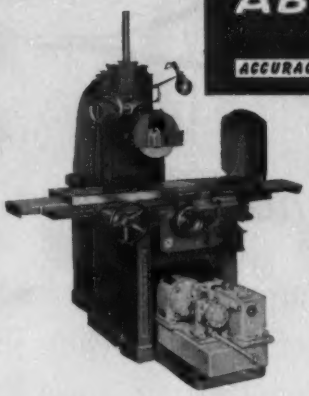
ARMCO

This drainage gate hoist made by Hardesty Division—Armco Drainage and Metal Products, Inc., may be installed in some isolated spot remote from repair service should trouble develop. That's one reason why it is Aetna bearing-equipped—why, even if not used for long periods of time, it will operate easily, efficiently and dependably.

IDEAL

Ideal Windlass Company, manufacturers of deck machinery for pleasure and commercial boats, uses Aetna bearings in all models of their electric anchor windlasses to help handle anchor loads of 500 pounds and more in minimum space, at maximum speeds—to reduce wear on other working parts, save electric power and insure trouble-free, longer equipment life.

ABRASIVE
ACCURACY BOOSTS PRODUCTION



Abrasive Machine Tool Company makes sure its surface grinders have what it takes to stay on non-stop jobs with minimum maintenance and downtime by using Aetna bearings on the elevating screw in the head assembly of this No. 1218 type horizontal spindle grinder.

AETNA BEARINGS

bring important advantages to these fine products

Here are widely varied examples of Aetna bearing applications. Why are they used in such mechanically simple products as medical tables and drainage gate hoists? The answer is simple. Aetna bearings make any moving device—big or small, simple or complex—more efficient, more serviceable, more salable.

Consider your own product. Is it one of the many that still doesn't—but could—use bearings? If it is and if you want to put it out in front of competition, value-wise and sales-wise it might pay you handsomely to talk things over with Aetna. Write now while your mind is on your product's future.

Standard and Special Ball Thrust Bearings • Angular Contact Ball Bearings • Special Roller Bearings • Ball Retainers • Hardened and Ground Washers • Sleeves • Bushings • Miscellaneous Precision Parts.

AETNA BALL AND ROLLER BEARING COMPANY
DIVISION OF PARKERSBURG-AETNA CORPORATION
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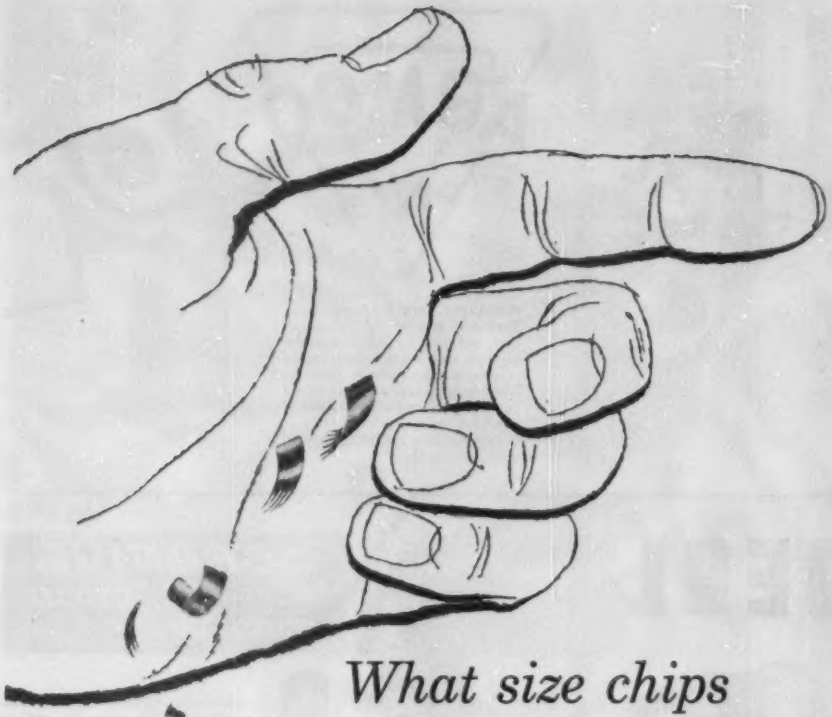

What size chips should a brass rod yield?

For easier cutting and clearing, for *longer tool life,* those chips should be *short.* Chase Free-Cutting Brass Rod has just the precise amount of lead to yield these shorter chips. Chase rod means a lower unit cost on your products too — it's cleaner, smoother-surfaced, less expensive to buff or polish before finishing. Available in a wide variety of alloys. Call your nearest Chase Sales Office or Warehouse.

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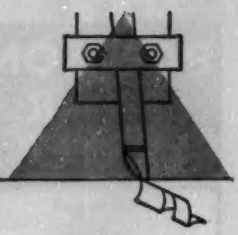
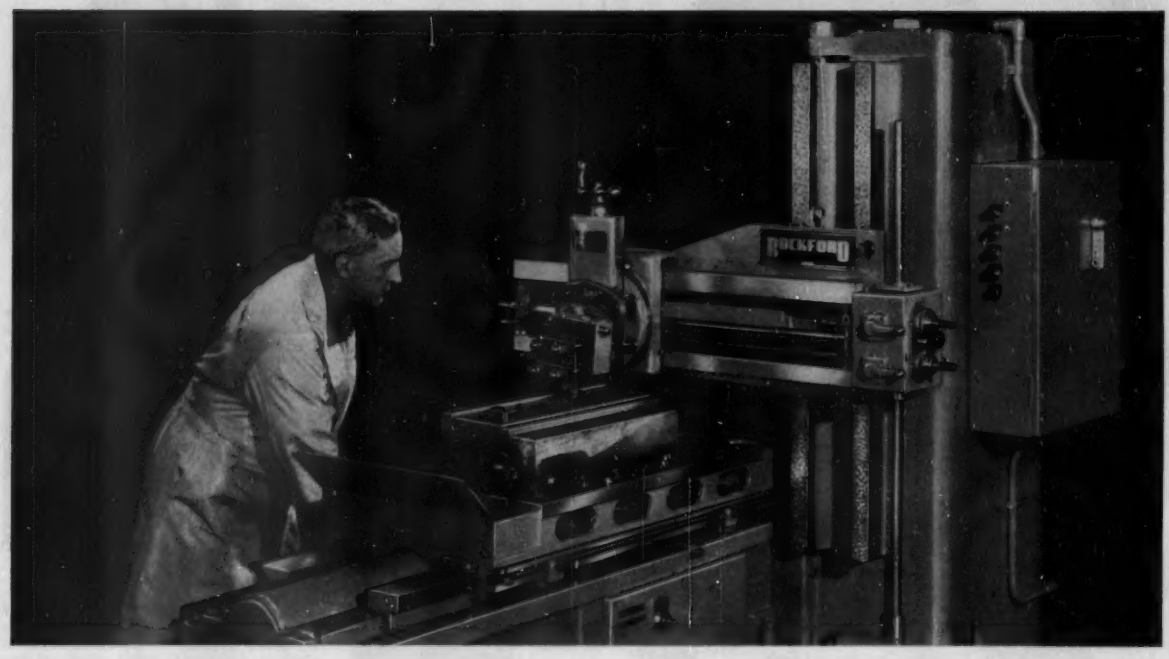
Boston	Dallas	Indianapolis	Minneapolis	Philadelphia	St. Louis	(†sales office only)



how much does an openside shaper cost?

rockford hydraulic-driven 36″ openside

shaper



you may be **surprised to know** . . . . . that you can buy the 36″ Openside Shaper for little more than the cost of a ram-type shaper. Yet the 36″ openside offers the advantages of planer accuracy and easy set-up, in addition to production flexibility. The standard machine complete with electrical equipment can be bought for as little as $9,035.00. Side head, hydraulic tool lift and other accessories are extra at popular prices. Similar machines are also built in 48″, 60″ and 72″ table lengths and priced accordingly. Consult your Rockford Machine Tool Co. representative for full details or write direct.

Get this handy time calculator for use in estimating machining time for shaping and planing operations. Request on company letterhead will bring one promptly.

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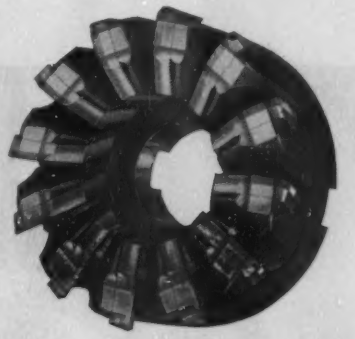

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RIVETERS — PIONEERS in their line—head rivets from smallest to ¾" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—Sizes to meet all needs—Types include Vertical and Horizontal Multiple Spindles.

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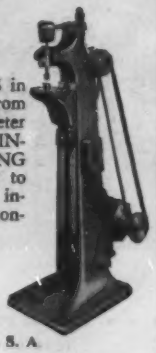

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A typical SWISS high-precision machine tool sold and serviced by HIRSCHMANN. Hauser Type 5 Jig Borer. The ultimate in precision and quality.

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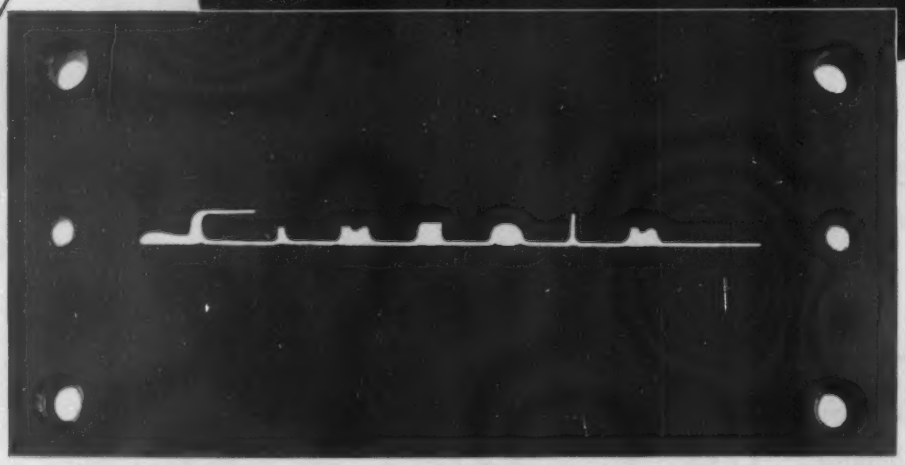
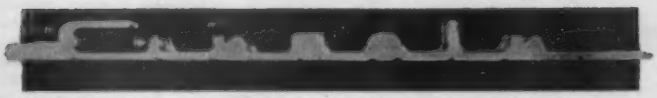
can you make this trim die in eleven hours in your plant?



FINISH TRIM DIE



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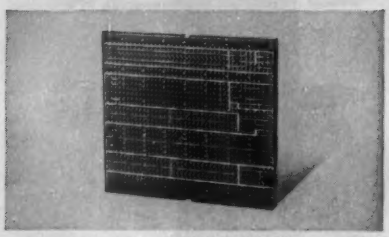
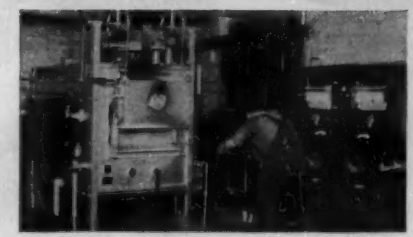
Make this *3-Minute Check* . . . Discover how a *modern* die steel can give you diemaking and production advantages no other steel offers you!

Are you aware of how tool and die steels have been improved in the last 5 to 10 years? New steels are now available that handle easier, run longer between grinds, bring down diemaking costs. Here are facts about *Vega* (Air-Tough) Die Steel—just one steel in Carpenter's Matched Set of 12 modern die steels. Compare *Vega* and what it offers, with the die steel you're using. Check it point by point. You'll see what a difference a Carpenter Matched Tool and Die Steel can mean to *your* production and profits. THE CARPENTER STEEL CO., 109 W. Bern St., Reading, Pa.

Here is what *Vega* gives you . . . *COMPARE* it with the die steel *you* use . . .

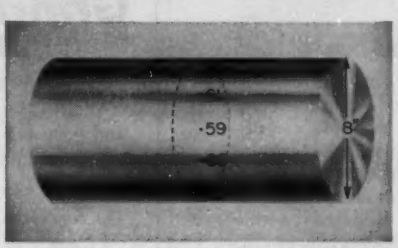


Freedom from Size Change in Hardening. The mold for this 9½" x 10½" plastic control panel has 1,280 5/32" dia. holes, six ⅜" dia. horizontal ports for heating and cooling, plus eight ¾" dia. tapered holes on the edge. *Vega* was the *only* steel of many tried that could successfully hold the close tolerances of .0002" on centers of the 1,280 holes! Will the steel you use behave in hardening like this?

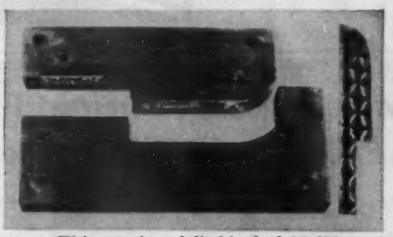


Easy, Low Temperature Heat Treating. You heat treat *Vega* from a temperature of only 1550°F (actually 200°F *lower* than the 5% chromium air-hardening grades!). No need for special, high temperature furnaces! Are you getting the benefits of *low temperature* heat treating from the air-hardening steel you use?

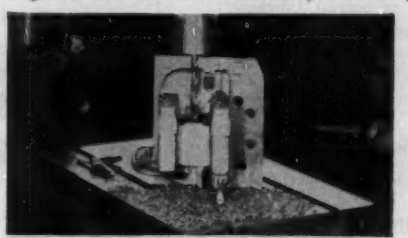
Extra Economy in Hardening. Because of *Vega's* lower hardening temperature, troublesome pack hardening to avoid excessive scaling is usually unnecessary. Does the air-hardening steel you use give you this *extra economy* in hardening?



Uniform Deep Hardenability. *Vega* gives you the advantages of uniform, deep hardenability in very heavy sections. For example, *Vega* hardens to Rockwell C-60 from surface to center in sections as large as 8" round. How does the steel you use compare on this score?



Toughness with Good Hardness. This punch and die blanks ¼" diamond threshold plates at one stroke. With previous air-hardening die steel, tools chipped and broke before any real production was made. With *Vega* these tools are in regular production—and there are no signs of wear or chipping to date. Will the steel you use perform in service like this?



Good Machinability. Unlike ordinary air-hardening grades, *Vega* has a well balanced analysis with a small percentage of hard-to-machine alloys. Field tests prove it to be one of the easiest of all air-hardening grades to machine. If the air-hardening grade you use fails to provide this *good machinability*, you're missing out on lower costs.

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From the *American Machinist* Library of *Tips for Top Shop Men*

DESPISE the political maneuver called "damnation by innuendo". The apparently innocent question, "Does Johnson beat his wife?" is just as harmful to Johnson in the long run as your positive statement that he does. Watch remarks like "Is Smith slipping?", or "Is Jones' health poor?", unless you have a malicious desire to see the thing happen.

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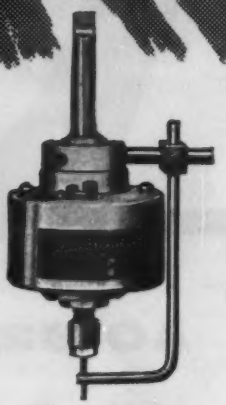

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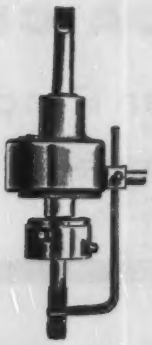
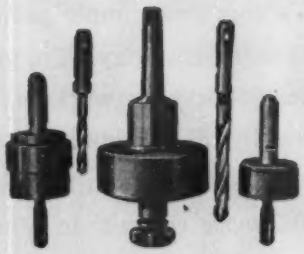
Designed for Ball Bearing High Speed Drill Press.



POSITIVE
For through holes where work is drilled and then re-handled and tapped.



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Tool-Holders to Drill, Tap and Set Studs, etc., without moving work, or stopping or reversing machine. Individual friction adjustment in each tap-holder, if required.

These Tappers may also be adapted for button or acorn die threading.

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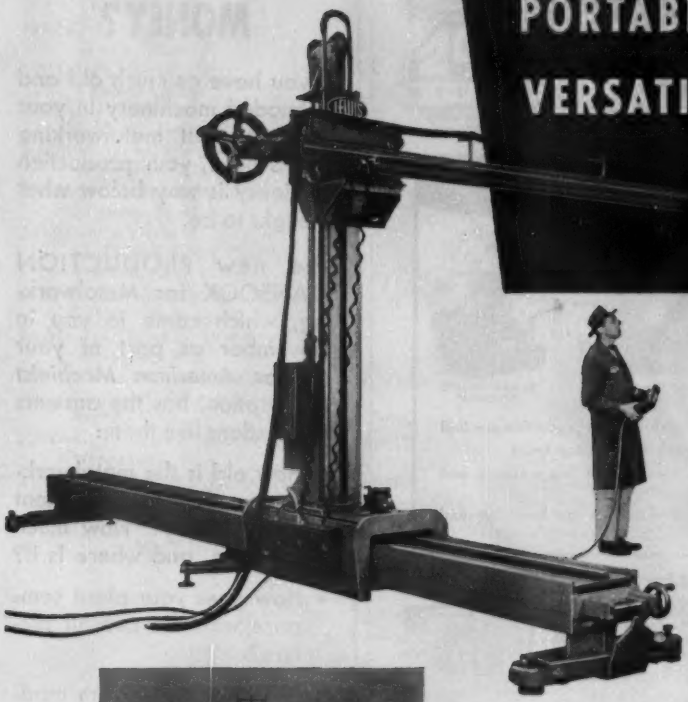

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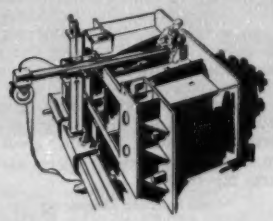

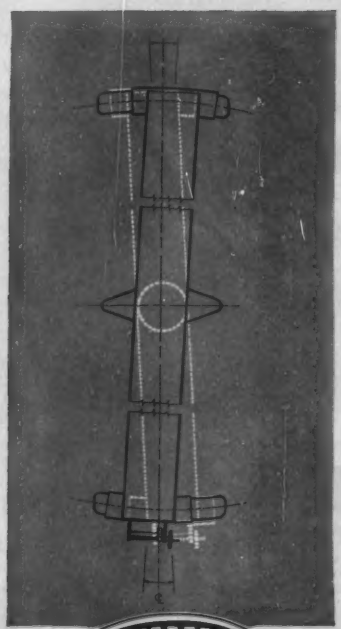

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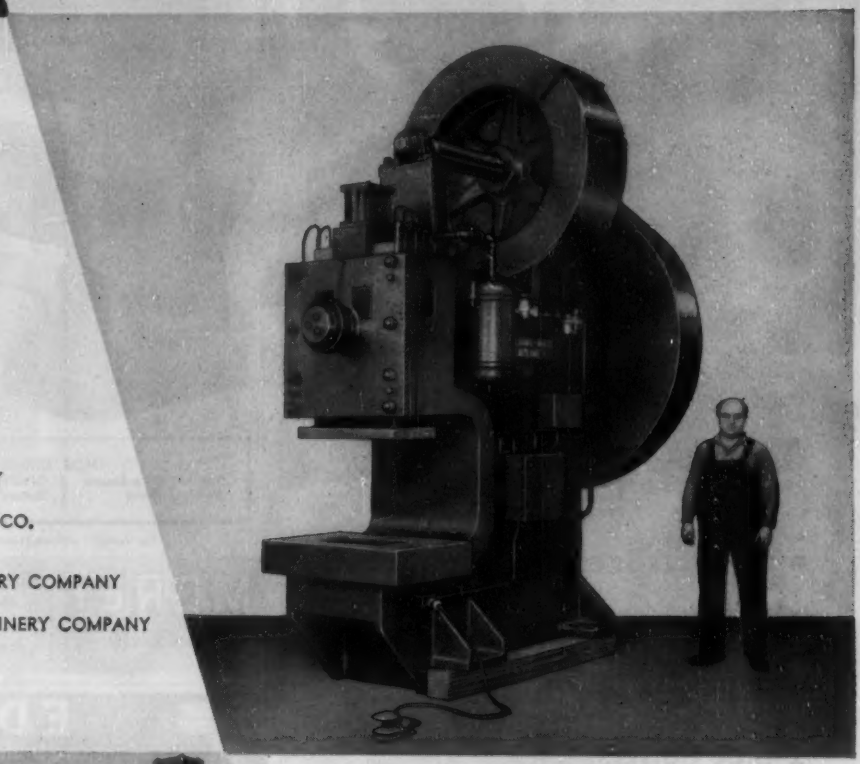

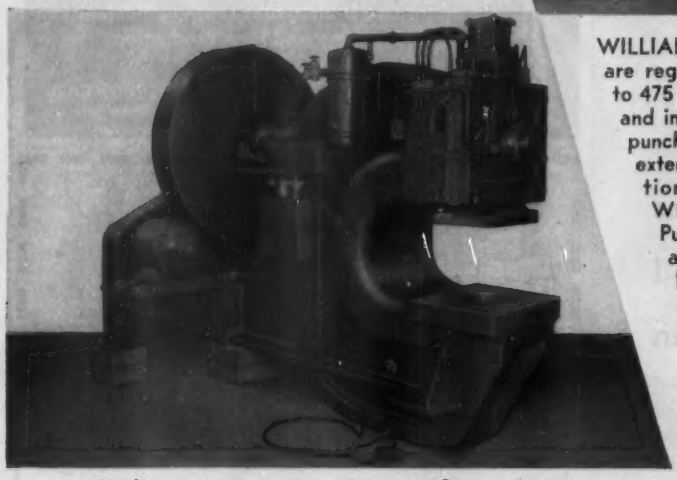

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Number	11-P	12
Throat, inches	11	25
Capacity, tons	400	200
Stroke, inches	3½	2
Die space, inches	20⅜	16
Die space adjustment, inches	¾	¾

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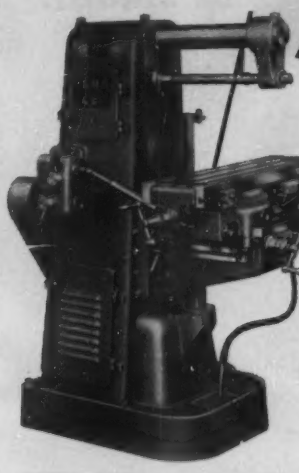

PARTIAL SPECIFICATIONS
Size of table..... 29½" x 9-1/16"
39⅛" x 9-1/16"
Longitudinal power feed to table ..... 19½"
Spindle speeds (12) 53-1250 RPM
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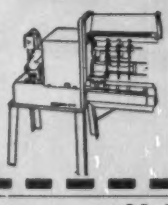

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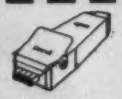

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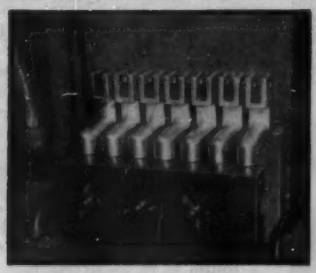
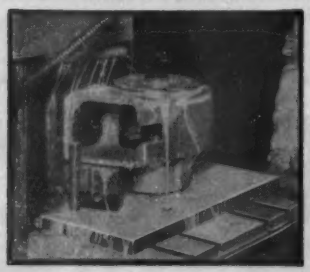
Do your machining up to 10 times faster!

• Originally turned on lathe, now rough and finish-ground at 600 per hour.



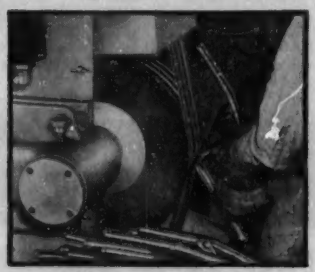
• These pieces formerly *milled* now belt-ground 5 times faster.

• Grinds broad areas flatter and faster than *radial surface grinder.*



• This grinding operation 100% faster than former *milling* time.

• Generates 2 radii at double the output by *hand filing* and *polishing.*



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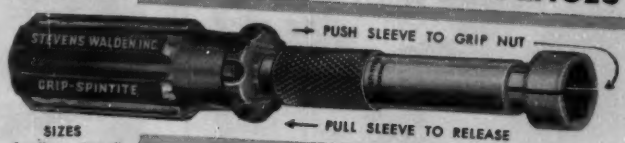

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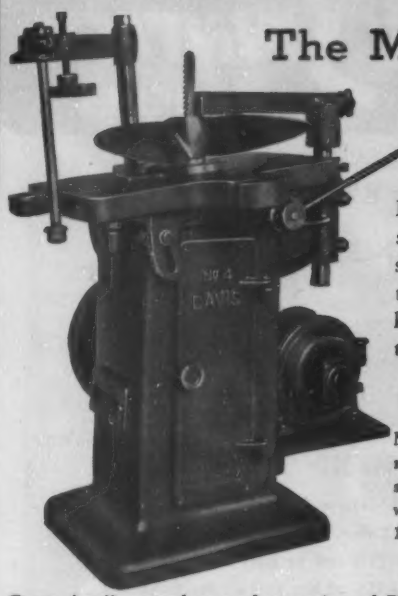

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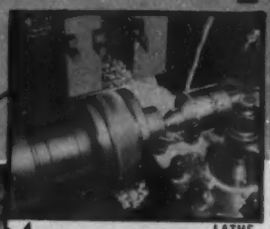

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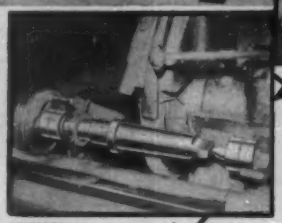

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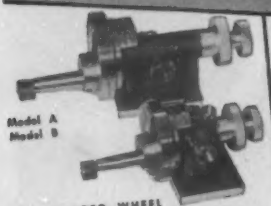

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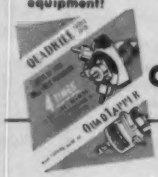
one drill press does the work of FOUR

Send NOW for additional information on how YOU can increase YOUR production without additional equipment!



Drill — ream — countersink and counterbore, all on one drill press without setting up for each operation. A simple rotation of this turret head brings any one of four drills or cutting tools into position. Accurate — fast — economical! Try Quadrill — it will earn you more profit thru less production cost.

CHICAGO QUADRILL *Company*

1844 BUSSE HIGHWAY, DESPLAINES, ILLINOIS

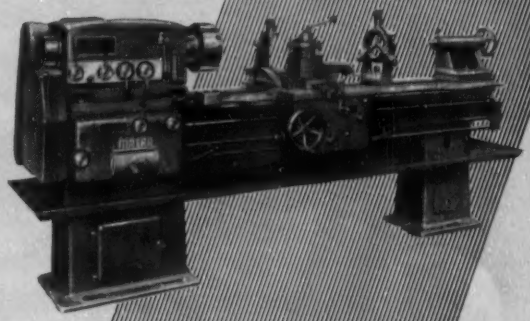
May

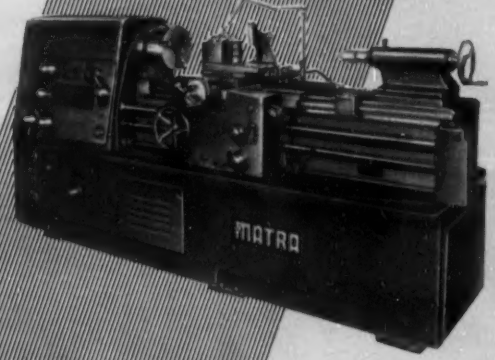
Twist Drills
Counterbores
Reamers
Cutters
Cutter Heads
Thread Cutting Tools
Special-Tools
Carbide Tools
Gauges
Chucks
Grinding Machines

ROHDE & DÖRRENBERG
MANUFACTURERS OF TWIST DRILLS, TOOLS AND MACHINE TOOLS
DUSSELDORF-OBERKASSEL

MATRA

High Speed Precision Lathe Model MDR 22/25 height of centres 220 or 250 mm distance between centres 1000 to 4000 mm





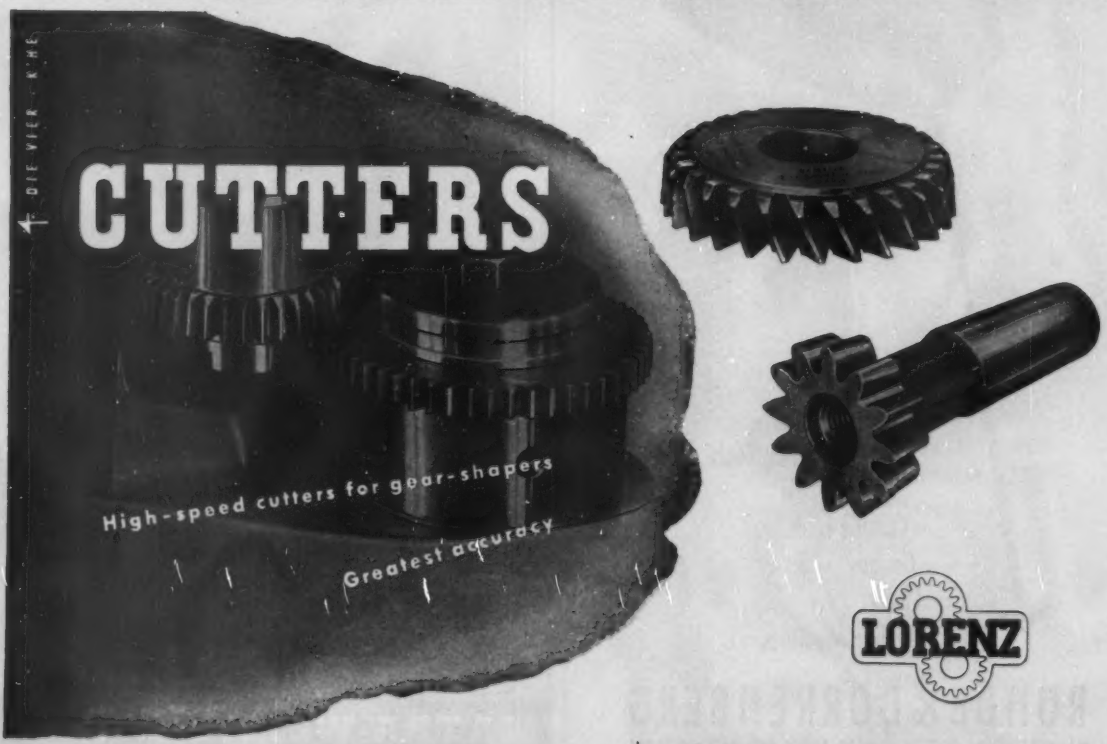
High Speed Production Lathe Model MDR 20 height of centres 200 mm distance between centres 1150 mm

MATRA-WERKE G.M.B.H.
FRANKFURT A. MAIN 301

Forkardt-Chuck

No bevel wheels and spiral threads with their inherent deficiencies –
Transmission of power by wedge chain:
Highest gripping power – High resistance to wear –
Permanent gripping accuracy.

Paul Forkardt · Kommanditgesellschaft · Düsseldorf · Germany



MASCHINENFABRIK LORENZ AG ETTLINGEN/BADEN · GERMANY

HOMMEL OPSM

Always well-focused projection of the grinding wheel reciprocation. Bright and clear projection even under normal light conditions. Accuracy of ground profile regardless of the shape of grinding wheel edge.

...he optical, fully hydraulic, profile grinding machine

for vertical, oblique and cylindrical grinding of all profiles, directly from enlarged drawing. Infinitely variable adjustment of diminution from 1:10 to 1:50

HOMMEL-WERKE GMBH MANNHEIM-KAEFERTAL

P. O. B. 30 GERMANY

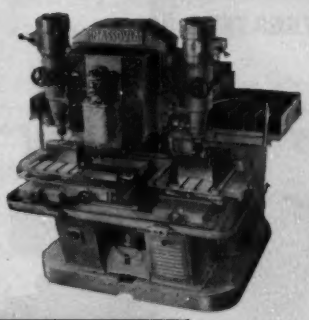
DURIA CEMENTED CARBIDE

for all mining purposes as well as metal cutting and non-cutting shaping of latest production with the best effect

DURIA

DURIA-WERK
KARL KEMPF K.G.
WERK NEUSS a. RHEIN
Bockholtstraße 151 · Ruf 2902 2698

NASSOVIA



Sentidux

with 2 milling spindles and 1 tracer head
Electro-hydraulic universal machine for die-sinking and contour milling
Workpiece: ± 0,0004" – 0,0012"
Surface finish: 0,00004" – 0,0002"

NASSOVIA MASCHINENFABRIK HANNS FICKERT G.M.B.H.
LANGEN BEZ. FRANKFURT AM MAIN GERMANY-WEST

Wolverine

Heavy Duty

QUICK ACTION TOGGLE CLAMPS

Extra CLEARANCE

Extra SPEED

CQ-1100 SERIES TOGGLE CLAMP

CQ-800 SERIES TOGGLE CLAMP

Rugged construction—drop forgings, cast steel and solid bar stock.

• • •

Wolverine Toggle Clamps also available in several types and sizes of Standard Action and Push Action units.

• • •

Wolverine Clamps are in use in almost every major industrial field and are specified by prominent engineering firms. Write for Bulletin.

WOLVERINE TOOL CO.

1484 E. WOODBRIDGE

DETROIT 7, MICHIGAN

Original MAUSER

»Mauser«

always means quality and precision

IWK INDUSTRIE-WERKE KARLSRUHE Aktiengesellschaft, KARLSRUHE GERMANY

M&M

GIANT KEYSEATERS

M & M Giant Keyseaters, built in a wide range of sizes, speedily and accurately cut internal keyways or splines in the bores of pulleys, gears, fly wheels or any other machine part. Special fixtures and cutters are available for unusual shaped keyways and taper work. Send us your problems today.

MITTS & MERRILL 68

104 Holden Street • SAGINAW, MICHIGAN

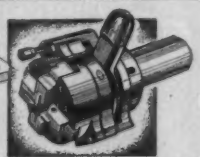
INDEXING TURNTABLES

A SPECIALIZED CAM MILLING SERVICE. SPOT AND BUTT WELDING, TURNTABLES, POSITIONERS FOR BRAZING, SPRAYING, WELDING, SOLDERING OVER 100 TYPES CONTRACT PRODUCTION, SPECIAL AUTOMATIC MACHINES.

EISLER ENGINEERING CO., INC.

738 So. 13th St., Newark 3, N. J.

H&G Insert Chaser DIE HEADS



famous for accuracy and straightness of threads, low chaser costs, less downtime, more pieces per day.

THE EASTERN MACHINE SCREW CORP., 20-40 Barclay St., New Haven, Conn.

Pacific Coast Representative: *A. C. Behringer, 334 N. San Pedro St., Los Angeles, Calif.* Canada: *F. F. Barber Machinery Co., Toronto, Can.*

NOT This—But This

When Your Punch Press Operators Use

SAFEED Patented

PREVENTS INJURY — Saves Glove Costs. Feeds ferrous, non-ferrous strip or sheet . . . faster, safer. Use for stamping, shearing. Right or left hand non-slip fitted grip, self - adjusting. Sturdy hardened work surfaces.

Fully Guaranteed

Write today. Early delivery.

AFFILIATED MACHINE & TOOL COMPANY

260 West St., New York 13, N. Y. CAnal 6-4938

CLASSIFIED SEARCHLIGHT SECTION ADVERTISING

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

UNDISPLAYED RATE

$1.50 per line, minimum 3 lines. To figure advance payment count 5 average words as a line.

BOX NUMBERS count 1 line additional.

POSITION WANTED undisplayed rate is one-half of above, payable in advance.

PROPOSALS $1.50 a line an insertion.

INFORMATION

DISCOUNT of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

EQUIPMENT WANTED OR FOR SALE Advertisements acceptable only in Displayed Style.

DISPLAYED RATE

The advertising rate is $12.60 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches to a page. A. M.

NEW ADVERTISEMENTS: Address N.Y. Office, 330 W. 42 St., N.Y. 36, N.Y., for June 21st issue closing June 7th.

PEACOCK CORPORATION
Propane Gas Installations
and
Anhydrous Ammonia Plants
Paul E. Peacock, Jr., Pres.
Box 268 Westfield, N. J. Westfield 2-6258

MACHINE TOOL RECONDITIONING & the Art of Hand Scraping
— Illustrated —
Write today for folder describing book
MACHINE TOOL PUBLICATIONS
215 Commerce Bldg., Fourth & Wabasha Sts.
St. Paul 1, Minn.

REPLIES (Box No.):
Address to office nearest you
NEW YORK: 330 W. 42 St. (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

SELLING OPPORTUNITIES OFFERED

MACHINE TOOL Salesman to live in and cover Mid-west territory. Represent old, established house selling machine tools and steel to industrial trade. Must have had several years experience in one or both of these lines. Salary and drawing account against commissions—$7,500 minimum yearly guarantee with all expenses paid. Please state age, experience, and references in first letter. Our salesmen know of this ad. SW-2263, American Machinist.

MANUFACTURERS REPRESENTATIVES—To represent large Mid-Western manufacturer of speed reducing transmissions and cut gears of all types, on a commission basis, for area around Los Angeles, California—Must be experienced in engineering and sales—All replies strictly confidential. RW-2715, American Machinist.

EMPLOYMENT SERVICE

SALARIED POSITIONS $5,000 to $35,000. We offer the original personal employment service (established 44 years). Procedure of highest ethical standard is individualized to your personal requirements. Identity covered; present position protected. Ask for particulars. R. W. Bixby, Inc., 652 Brisbane Bldg., Buffalo 3, N. Y.

BUSINESS OPPORTUNITY

LICENSE TO manufacture small tools available. $3,000,000 annual business. Tool proven to be three times better than competition. One License available on East Coast and one on the West Coast. Takes $500,000 for License and special tools. Box BO-2850, American Machinist.

"SEARCHLIGHT"
IS
Opportunity Advertising

—to help you get what you want.
—to help you sell what you no longer need.

Take Advantage Of It

For Every Business Want

"THINK SEARCHLIGHT FIRST"

SEARCHLIGHT
Equipment Spotting
SERVICE

This service is aimed at helping you, the reader of AMERICAN MACHINIST, locate used and surplus new metalworking machinery and equipment not currently advertised. (This service is for user-buyers only.)

First, read the dealer ads on the following pages. A 5-minute study may locate the equipment now.

Second, send in the specifications of the equipment wanted on the coupon below, or on your own company letterhead, to

Searchlight Equipment Spotting Service
c/o American Machinist
330 W. 42nd St., N.Y. 36, N.Y.

Your requirements will be brought promptly to the attention of the used equipment dealers advertising in this issue. You will receive replies directly from them.

NO CHARGE • NO OBLIGATION

Searchlight Equipment Spotting Service
c/o American Machinist
330 W. 42nd St., New York 36, N. Y.

Please help us locate the following used equipment:

.....

.....

.....

.....

NAME ..... TITLE .....

COMPANY .....

STREET .....

CITY ..... ZONE ..... STATE .....

6/7/54

The world's best . . . one-piece, drop-forged—not welded—of mild carbon steel, heat-treated, with head accurately milled for standard tables on lathes, planers, boring mills, milling machines. Integral washer and nut. Sizes: up to 30". Write for prices.

THE OK TOOL COMPANY
MILFORD 2, NEW HAMPSHIRE

MODERN MANUFACTURING FACILITIES AVAILABLE IN OUR MACHINED AIRCRAFT PARTS DEPT.

Monarch Air Tracer Lathe—20" & 14"
(Shaft work up to 14x40. Contour Turning 28" diameter.)
Monarch Keller Lathe—16"
Hendey & Monarch Engine Lathes
Internal & External Grinders
Also modern drilling and milling equipment

J. G. TILP, INC.
BOX 554, UNION, NEW JERSEY

PATTERNS in WOOD and METAL
For All Kinds of Castings, Large or Small
MATCH PLATE WORK A SPECIALTY
Put your pattern problems up to us – we will take care of them.
GENERAL PATTERN WORKS
2233 Buck Street Cincinnati, Ohio

AVAILABLE MACHINE TIME

Manufacturer in New York Metropolitan Area with 50 years experience in precision work has some available machine time for following:

Internal Grinding
Cylindrical Grinding
Gear Grinding
Parts Made Complete

Send prints for Quotation.

CW-2623, AMERICAN MACHINIST
330 W. 42nd St., New York 36, N. Y.

GENERAL SERVICES ADMINISTRATION, 250 Hudson Street, New York 13, New York—Sealed bids on bid forms on Invitation No. GS2-AFD-(8)-9, will be received at this office until 10 AM June 23, 1954, E.D.T., and then opened for sale of the following: Approximately $672,000 of used and unused machine tools and equipment which have been screened against the known defense requirements of the Federal Government. Items offered for sale include balancing machines, boring machines, drilling machines, generator, grinding machines, grinders, lapping machines, milling machines, polishing machines, welding equipment, etc. Property located at General Services Administration Warehouse, Burlington, N. J. For bid forms and further information contact GSA Business Service Center, 250 Hudson St., New York 13, N. Y. Tel: ALgonquin 5-4300, Ext. 84. Inspection period June 7th through June 18th, 1954.

WANTED
48" x 48" x 16' PLANER

Must be 1940 or later, with 2 heads on rail, and at least 1 side head.

P. PETTLER & SON
P. O. Box 120, Beaver Falls, Pa. Phone 5700

MACHINERY WANTED

1 Michigan Shear Speed Gear Shaper, Model ‡1873
1 American Wheelabrator equipped with 48" diameter work table
1 Gleason Quenching Press ‡16
1 36" Bullard Cut Master Vertical Turret Lathe
1 Reishauer Gear Grinder, Type ZA
1 Fellows 20M Red Liner Measuring Instrument
1 Fellows 12M Involute Measuring Instrument

Advise age, serial numbers, condition and full particulars

W-2529, AMERICAN MACHINIST
330 W. 42nd St., New York 36, N. Y.

MACHINERY WANTED

Bullard Mult-Au-Matic 12" with 8 Stations for Double Indexing. Should Be Built 1945 or Later. Give Serial ‡, Age, Condition and Price.

W-2908, AMERICAN MACHINIST
330 W. 42nd St., New York 36, N. Y.

These advertisements

are current, live opportunities in the metal-working field.

Each advertisement represents a current Want or Offering of an organization or individual in this field, with some element of profit in each for whoever can fill the need. Some have money-saving possibilities, others are opportunities for more business; many are employment opportunities; still others offer property, or equipment used or surplus new equipment.

"Searchlight" advertisements are constantly changing. New opportunities are finding their way into this great Want medium each issue. Regular consultation of the "Searchlight" pages can be as important to you as reading the text pages of each issue; Text matter is news of progress and development in the industry, "Searchlight" advertising is news of current "Opportunities" in this industry.

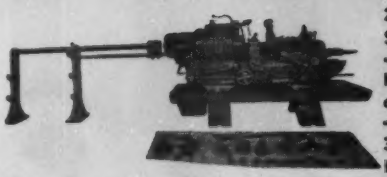
for EVERY business WANT "Think SEARCHLIGHT first"

BUY FROM STOCK
Telephone
BAKER 5887

FALK
MACHINERY COMPANY

10 WARD ST.
ROCHESTER 5
N. Y.

Every Item Guaranteed as Represented



No. 7 BARDONS & OLIVER Universal Turret Lathe. 2½" capacity. Preselector Head, Late Type.

No. 00G BROWN & SHARPE High Speed Automatic Screw Machine, Motor Driven, Late type.

No. 1 LaPOINTE Motor Driven Horizontal Broach, 5 tons cap., 38" stroke.

50 HP. CHICAGO PNEUMATIC Air Compressor. Type NSB, 253 CFM, Piston Displacement.

4'x15" Column CINCINNATI-BICKFORD "Super-Service" Radial Drill, Motor on arm, Box table.

4' x 15" Carlton Radial Drill, Motor on arm, 48 spindle speeds, 1943, Late Type.

No. 262 BARNES Motor Driven Sliding Head Drill Press. 2" cap. in steel.

No. 2 M.T. Six Spindle ALLEN Type KH Drill Press, Individual Motor Drive, Late Type.

6"x18" LANDIS Type "C" M.D. Hydraulic Cylindrical Grinder, Serial ‡29196.

6"x18" NORTON Vertical Hydraulic Surface Grinder, complete with magnetic chucks, coolant systems, Late Model.

‡TG615 JONES & LAMSON Thread Grinder, Late, M.D. and TG848.

No. 208 BESLEY Motor Driven Disc Grinder, 26" wheels, Late Type.

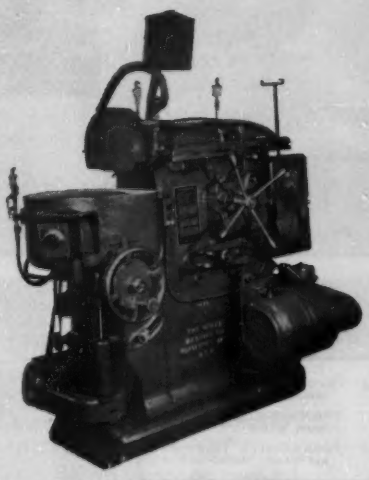
No. 8LS FELLOWS M.D. Gear Lapping Machine. With Detachable Head, Universal Work Support.

20", 24" 28" Gould & Eberhardt V-Ram Shapers, M.D.

No. 194 BARNES Vertical Hone, 4" capacity, 12" stroke, Motor Driven.

30 K.W. LEPEL High Frequency Induction Heater.

16"x54" centers AMERICAN Pacemaker Lathe, Taper Attachment, Late Model.



No. 22 HEALD MOTOR DRIVEN ROTARY SURFACE GRINDER. 12" Magnetic Chuck. Late Model.

20"/27¾"x14' AXELSON Lathe, 115" centers, Taper Attachment, Late.

24"x12' BOYE & EMMES Timken Bearing, Geared Head, Lathe. Late Type.

27"x16' NILES, BEMENT, & POND Geared Head Lathe, 9' centers, M.D.

24", 36" BULLARD Vertical Turret Lathe, New Era, Turret Head, Side Head, Motor Driven.

No. 601 W.D. OSTER Motor Driven Turret Lathe, 1½" capacity, Late.

No. 2, No. 5 WARNER & SWASEY Geared Head Turret Lathes, Bar Feed, Motor Driven.

‡2 KEMPSMITH Horiz. Maxi-Mill, Motor in base, Vert. Head.

‡08 CINCINNATI Vert. Mill, Plain & Rotary Table Type.

‡3B KEARNEY & TRECKER Vertical Milling Machine, Motor in base.

No. 0-8 CINCINNATI Rise & Fall Horiz. Mill, Late Model.

No. 3B KEARNEY & TRECKER Horiz. Mill, Double Overarm, Motor in base.

No. 2M CINCINNATI Universal Horizontal Mill, Full Equipment, M.D.

‡M200 DEFIANCE Production Drilling Machine. 2" Cap. in Steel.
‡5 M.T., Coolant System. Late Type. 26" Swing, 1942.

No. 5 FEDERAL Open Back Inclinable 4" stroke, Timken Bearing Flywheel, M.D.

600 ton NILES-BEMENT-POND Motor Driven Wheel Press, 86" between strain rods, 14' cap., 17" diam. ram.

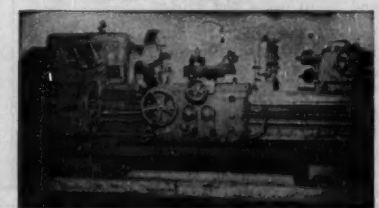
‡5, ‡7, ‡8 JOHNSON O.B.I. Presses. 56, 79, 90 tons cap. M.D. Flywheel & Geared Type.

10"x10" RACINE ‡30-C Hydraulic Heavy Duty Shear Cut Power Hack Saw, 1946.

10'x10 ga., 10'x¼" WYSONG & MILES Power Squaring Shears, Motor Driven.

No. 20, WATERBURY FARREL Thread Roller, ⅜" cap., 1944.

‡0, 1½ BUFFALO FORGE Universal Ironworker, Notcher, M.D.



24"x10' AXELSON GEARED HEAD, HEAVY DUTY MODEL "E" 28" ACTUAL SWING, M.D. TAPER ATTACHMENT.

OVER 1000 MACHINE TOOLS AVAILABLE IN STOCK • SEND US YOUR INQUIRIES

TREMENDOUS MACHINES AT TREMENDOUS SAVINGS

LAKE ERIE PRESS
2500 TON

36" Downstroke; 42" Daylight.
Bot. Platen 120" L. to R. 96" F. to R.
Between columns 58" L. to R. 60" F. to R.
100 H.P. 3/60/440 V. motor. Push button controlled.

OHIO 5"
HORIZONTAL BORING MACHINE

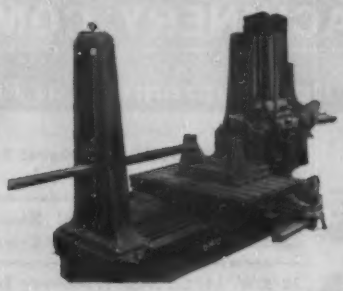


Table 48" x 84"; bed length 10'.
Speeds: 3.3 to 198 RPM; vertical travel 60"; rapid traverse; facing attachment; AC motor.

JONES 60"
VERTICAL SHAPER

Table—72" diameter. Will move a distance of 36" either to the left or right of tool. Bed Length 154".

Write, Wire or Phone Your Inquiries

AARON MACHINERY CO., Inc., 45 CROSBY ST., NEW YORK 12, N. Y.

Cable: AARMACH, N. Y. — *Rentals—Time Payments to 3 years* — Tel: WOrth 4-8233

LOOK TO THE LEADER . . . *for the finest Profit-Producing Machine Tools at a fraction of New-Machine costs!*

ENTIRE PLANTS APPRAISED AND LIQUIDATED

J & L Two Spindle Turret Lathe
AMERICAN 24" Shaper
BLISS #5 Back Geared Punch Press
LEPCIO High Frequency Welder
THOMSON-GIBB Circular Seam Welder
PROGRESSIVE Longitudinal Seam Welder

WE SELL NEW FOREIGN EQUIPMENT

Serving Industry with New, Used & Rebuilt Machinery Since 1932

SPRINGFIELD AUCTION COMPANY

749 DWIGHT ST. • SPRINGFIELD, MASS. • 4-8896 • 4-0731

UNUSUAL ITEMS

Priced To Sell!

Bullard 44" Maxi-Mill—M.D. All Rapid Traverse, 2 Swivel Heads on Rail, New 1927. Exceptionally Clean $5950.00

Heald 72A5—65" extended bed bridge type Internal Grinder, New 1941. Cost $18,000.00 ..... $4250.00

Potter & Johnston 6DREL Automatic Chucker, new 1940 But Never Run. New Cost $20,805.00 ..... $9750.00

Brown & Sharpe #4 14"x60" cap. Universal Cylindrical Grinder. Internal Spindle. New 1942. New Cost $16,300.00..... $4950.00

Foster Hydraulic Superfinisher 4"x18" cap. New 1942. New cost $6280.00..... $950.00

Complete stock list upon request.

UNITED MACHINERY and Tool Corp.

85 Thomas St., Worcester 8, Mass.
Telephone 6-7171

MACHINERY FOR SALE

Brown and Sharpe Hobber, No. 44, serial No. 104 with Crocker Wheeler Motor, serial No. 748275. Equipped to cut spur and spiral gears and splines.

Schuchardt and Schutte Hobber, 36" CAP TP #2, serial No. 6706. Equipped with differential for cutting spur, spiral, and worm gears.

60" Reinecker Hobber, RF No. 4N, Serial No. 6937/1. Completely rebuilt. Equipped with Tangential feed and differential.

These hobbers now being used in production and in excellent condition. Can be seen in operation.

All of the above equipment motorized, 220 volts AC, 3 phase.

FS-8480, AMERICAN MACHINIST
330 W. 42 St., New York 36, N. Y.

10x10" MARVEL Hacksaw
Model J BRIDGEPORT Vert. Miller
#40 LEES BRADNER Thread Millers
#2 NORTON Tool & Cutter Grinder
#12 MARTIN Marking Machines
#4 JOHNSON O.B.I. Press
#72 ETNA Swager
#2 CAM HASKINS Tapper

Numerous Other Machine Tools

CURRIER MACHINE SALES
276 State Street
P.O. Box 292
North Haven, Connecticut

MTDA MEMBER

Hardinge Model HC-7 Chucker.
Gleason 3" Straight Bevel Gear Generator.
Cincinnati 6"x30" Grinder, plunge cut.
No. 3A B & S Universal Mill.

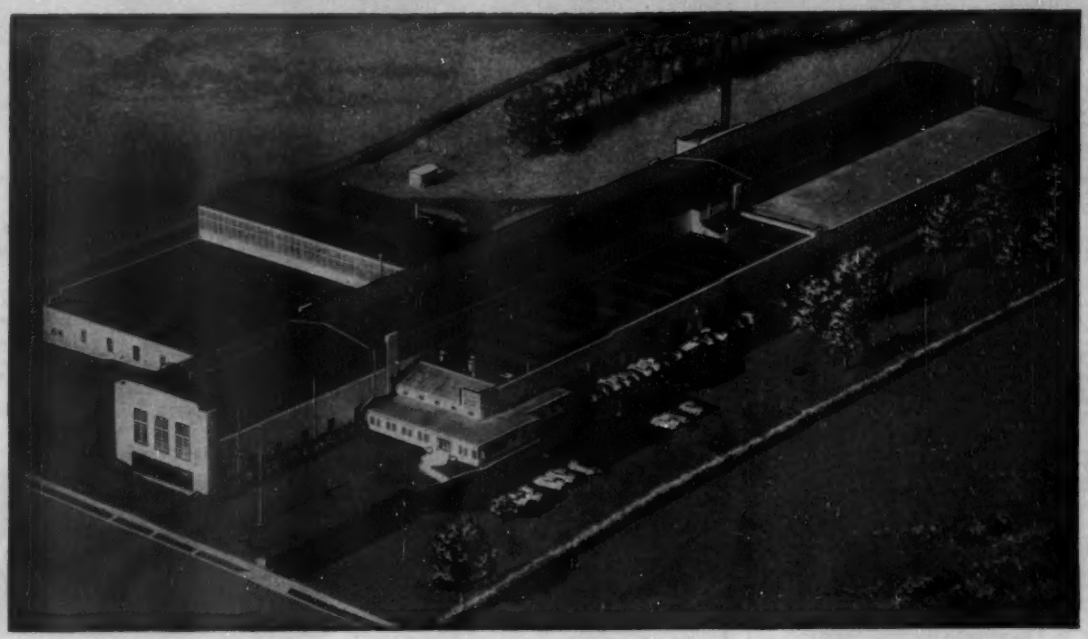
D. E. DONY MACHINERY CO.
4357 St. Paul Blvd., Rochester 17, N. Y.

42" Bullard VTL Spiral AC md—1944
42" Bullard VTL New Era
#31 Excello Thread Grinder—1944
2A Warner & Swasey Preselector—1941

J. D. WIGGLESWORTH MACHINERY CO.
848 W. Lake St. TAylor 9-0144 Chicago 7

Eastern Rebuilt Machine Tools

THE SIGN OF QUALITY — THE MARK OF DEPENDABILITY



AUTOMATICS

⅞" Cleveland Model B, belt
No. 6C Potter & Johnston, m.d.
14" Fay Flanders Type, m.d.
No. 8A Cleveland, m.d., 8" cap., latest
Model B—1-1/16" Cleveland, m.d.
No. 5 DELX Potter & Johnston, m.d., late

BOLT THREADERS

Victor Nut Facing Machine, m.d., cap. ⅜" to 2" nuts
1" Landis Double Spindle, m.d. thru gear box
1¼" Landis 2 spindle, late
1½" Landis 2 spindle, older type

HORIZONTAL BORING MILLS

Barrett Double End, 7" and 5" spindles, m.d.
No. 25T Giddings & Lewis Table Type, m.d.
No. 42 Lucas, m.d.
5½" bar Betts Floor Type, m.d.
5½" bar Niles-Bement-Pond, m.d.
6" bar Newton No. 2 Cylinder Borer, m.d.
10" bar Sellers Floor Type, m.d.
54"x11' Rectangular Table, 40" high
Floor Plate 8'11" wide by 9'1" long x 9¼" thick, 6 T slots
Table 40" wide x 22' long x 7" thick, 4 rows T slots
Pair Floor Plates 32" wide x 18' long x 10½" thick
Natco Horizontal Production Boring Machine, m.d.

VERTICAL BORING MILLS

38" Bullard, m.d.
42" Bullard Spiral Drive, m.d.
42" Bullard New Era, m.d.
42" King, with side head and plain swivel head on rail
44" Putnam, m.d., p.r.t.
44" Niles, m.d., p.r.t.
48" Colburn, m.d.
48" Niles-Bement-Pond Car Wheel Borer, m.d.
53" Niles Heavy Pattern, m.d., p.r.t.
73" Niles, m.d., p.r.t.
100" Niles Heavy, m.d., p.r.t.
102" Niles Wheel Turning Boring Mill
12' Niles, m.d., p.r.t.

BROACHING MACHINES

75 H.P. LaPointe Hydraulic Broach, m.d
Cincinnati Mill Broach, m.d., 10" spindles, new
12x72" Thompson Automatic Flat Broach, m.d.

RADIAL DRILLS

2'-9" col. Fosdick, m.d.
2½'-10" col. American Triple Purpose Plain, m.d.
3'-10" col. American Triple Purpose Plain, m.d.
3'-9" col. Morris, m.d.
3'-13" col. Cincinnati-Bickford Super-Service, m.d.
4'-11" Cincinnati-Bickford, m.d.
4'-11" Morris, m.d. on arm
4'-13" col. American Triple Purpose Plain, m.d.
5'-14" col. Carlton, m.d.
5'-15" col. American Triple Purpose, m.d. on arm
7'-16" col. American Triple Purpose, m.d.
7'-17" col. American Hole Wizard, m.d.
8'-17" col. Dreses, gear box, m.d.
8'-19" col. Cincinnati-Bickford Super-Service, m.d.
Zeus Precision Universal Bench Type Radials, m.d., new
Bausch Radial Drilling & Tapping Machine, m.d.

BALL BEARING DRILLS

No. 15 Buffalo Floor Model, m.d.
No. 18 Canedy Otto Bench Model, m.d.
Providence Engineering Co., Model E, s.p.d.
No. ½, 1, 2 Avey, belted m.d.
No. 1B Edlund, m.d., new
No. 4 Fosdick, 8" overhang, belted m.d., No. 2 Taper
1 spindle Allen, belted m.d.
2 spindle Allen, belted m.d., 8" overhang
No. 3 Allen, belted m.d.
No. 2LMS Leland-Gifford, single spindle, High Speed, m.d.
2 spindle Avey, size No. 1, type B, style VHP, m.d., 8" overhang
2 spindle Avey, No. 2, 3, belted m.d., p.f.
2 spindle #2 Leland & Gifford High Speed, 8" overhang, m.d.
#1LMS—3 spindle Leland & Gifford High Speed late, m.d.
3 spindle Leland & Gifford High Speed Model 3MS, m.d.
4 spindle No. 3 Avey, belted m.d., No. 3 Taper, 12" overhang
1 spindle Leland & Gifford High Speed, m.d. on each spindle
6 spindle Leland & Gifford, m.d. on each spindle, No. 2 Taper
6 spindle Henry & Wright, m.d., 15" overhang, No. 2 Taper
No. 4B—12 Edlund, m.d., No. 3 M.T.

HORIZONTAL DRILLS

3 way Natco Horizontal Drill, consisting of 3 E13 Heleunits
No. ½Bx30" Pratt & Whitney 2 spindle Deep Hole Reaming Machine, m.d.
No. ½Bx50" Pratt & Whitney Gun Barrel Rifling Machine, m.d., latest
No. 1Bx74" Pratt & Whitney 2 spindle Deep Hole Reaming Machine, m.d.
No. 1½x105" Pratt & Whitney 2 spindle Deep Hole Drill, m.d., latest
No. 1½x105" Pratt & Whitney 2 spindle Gun Barrel Rifling Machine, m.d.
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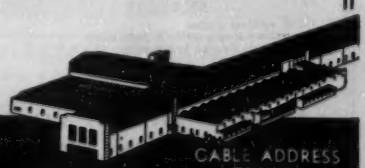

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275 CFM 10"x10" Union horizontal enclosed
311 CFM 12"x9" Ingersoll Rand air or gas
327 CFM 12"x7½"x12" Ingersoll Rand Imperial type
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3½' arm 8" column American sensitive radial
4' arm 13" column Carlton M1B radial, late type
6' arm, 3' extension, 16" column American radials, late type (two)

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No. 3 & No. 12 Barber Colman
Type A Barber Colman universal
No. 12H Heavy Gould & Eberhardt universal
No. 36H Gould & Eberhardt
16" Cincinnati spur and spiral
8'-10" No. 1 Loss Bradner
No. 7S Loss Bradner
No. 3 Adams Farwell
72" S. & S. universal

GEAR MACHINERY MISC.

8" Red Ring Gear Shaver, two, late
8" Red Ring gear lapper
No. 00 Cross gear tooth rounder
Barnes "Mod" Nut & Lap gear lapper
National Cleveland gear checker
10" Pratt & Whitney hydraulic gear grinder
Nos. 71A, 75A, 712 and 715 Fellows high speed gear shapers
Illinois gear measuring machine
No. 343 Sheffield gear chamferer

GRINDERS

72" Hanchett rotary surface, new 1946
10"x36" Landis type DC, cyl. late, hydraulic
14"x36" Landis type C, cyl. hydraulic, late
16"x36" Norton type C, cyl. hydraulic, late
No. 2 Cincinnati centerless, plain and Filmatic bearing (Five)
10"x16" Cincinnati Filmatic bearing
10"x18", 10"x36" & 18"x72" Norton cylindrical
12"x36" Cincinnati universal cylindrical, serial 1U-3D-1D-5
16"/40"x96" Landis hydraulic cylindrical, gap type
No. 16A and 24-36 Bryant
No. 120A Gardner opposed spindle disc, 20"
23" No. 84 Gardner opposed spindle disc
53" No. 24A Gardner horizontal disc
30" No. 8 Badger double disc motor on spindle
No. 72A3 Heald plain hydraulic internal
No. 72A3 Heald Gagematic internal
No. 72A3 Heald Sizematic internal
No. 5 Bryant internal
5"x18" Norton vert. spindle hydraulic surface
8"x22" No. 3 Abrasive surface
12"x48" Model 300 Hanchett surface new 1948
No. 3 Barber Colman hob sharpener
10" Pratt & Whitney hydraulic gear new 1944.

LATHES

24"x14' bed American GH, QCG, serial 44070
12" Sundstrand Stub lathes (three)
No. 3A Warner & Swasey long bed universal T/L, late
H5 Libby International saddle type universal T/L, late
Leonard hydraulic tube spinning lathe, new 1947
14"x42" Hendey CamLoc, timken, toolroom
14"x18" Lips H8 Carbo-lathe, new 1943
17"x6' LeBlond Mfg. timken, (three)
48"x52"x20'6" Niles-Bement-Pond engine lathe, like new

MILLING MACHINES

1-12 Cincinnati production miller
No. 2L Van Norman universal, vertical head, late
No. 3 Sundstrand Rigidmill production
12" Cincinnati plain manufacturing, also 18"
24"x24"x12' Ingersoll adjustable rail planer type mill mach., tracer controlled, new 1945
4—3B Cincinnati Hydromatic production
4—4B Cincinnati Hydromatic production
No. 2 Cincinnati high speed dial type plain
No. 1 Milwaukee vertical mill
No. 2B and 3K Milwaukee universal
No. 3B and 4K Kearney & Trecker plain

PRESSES

15 & 25 & 50 Ton Dennison hydraulic (4)
56 ton No. 304 Bliss, SS, solid frame, new 1942
56 Ton No. 23A Bliss OBI double crank, gap frame
90 ton No. 81 Cleveland, OBI (two)
83 ton No. 30-D-36 Cleveland, DC, steel frame
100 Ton No. 35P Toledo punching
106 ton No. 93D Toledo solid frame, DC
126 ton No. 308 Bliss, SS, tiered frame
500 ton No. 1042 Verson, SS, all steel, air clutch, late model
650 ton No. DA 8411 Hamilton SS, toggle drawing

SHAPERS

6" P&W vertical slotter
16" American Heavy pattern Auto-oiled
24" Cincinnati Climax heavy duty
32" G & E shaper
36" Morton draw cut shaper
36" Rockford vertical hyd slotter, 1942

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Gray Double Housing—36"x36"x32'—2 rail and 2 side heads—MD

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Ingersoll—48"x48"x18'—3 heads—MD

Ingersoll—72"x60"x20'—4 heads—MD

MILLERS

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Milwaukee #3K Plain—Range 34"x12"x18"—Table 64"x14"—#50 taper—Speeds to 1500 RPM—MD—Late type

Cincinnati #4 Plain—Rectangular overarm—Timken bearings—#50 taper—Power rapid traverse—MD

Milwaukee #3H Universal—Range 34"x12"x 17"—Table 64"x13½"—Dividing head—MD—Late type

Cincinnati #2 Dial Type Vertical—Range 28"x 12"x15"—Table working surface 49"x12"—Power rapid traverse—MD—Late

MISCELLANEOUS

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Norton #26 Hyprolap—Recently rebuilt—10 HP MD

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48" Jungenthal Vertical Turret Lathe. New.
650 Ton Verson Double Action Eccentric Press. 1940.
No. 41 Lucas Horizontal Boring Mill. 1941.
HP-100 LaPointe Horizontal Hydraulic Broach. 1945.
3'-9" Cincinnati Bickford Radial Drill, 1943.
12" Gleason Gear Generator. 1942.
No. 7 Gleason "Revex" Gear Rougher. 1943.
16"x72" Norton Univ. Grinder. 1942
17"x42" Norton Crank-o-Matic, 1943.
TG 6"x36" Jones & Lamson Thread Grinder. 1943.
No. 35 Excello Precision Thread Grinder.
24-36 Bryant Hydraulic Internal Grinder. 1942.
No. 72A3 Heald Plain Hydraulic Internal Grinder. 1941.
No. 10 Sundstrand Automatic Lathe F & R Slides. 1942.
No. 6DRE Potter & Johnston Automatic. Late.
No. H5 Libby Universal Saddle Type Turret Lathe. 1939.
No. 3R Gisholt Universal Saddle Type Turret Lathe. 1942.
No. M-18 Kearney & Trecker Simplex Mill. 1943.

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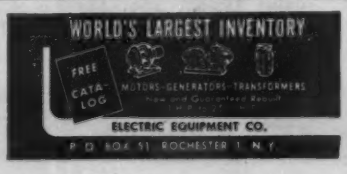

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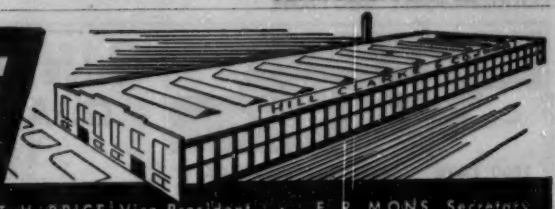

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Partial List

Automatics
1-1/16" Cleveland Model A (1942).

Boring Machines
No. DB2112 Excello Single End Borer
100" Niles-B-Pond Vert. Bor. Mill.

Drills
No. 2 Avey Cam Fd. Drill. 14" Swing.
2 Spdl.—24" SW.—No. 3 Avey.
No. 57H Fox 24 Spindle Multiple Drill (1943).

Gear Machines
11" Gleason Gear Generator.
No. 12HS Gould & Eberhardt.
No. 36-BM G. & E.—3 spdl. Rougher.
615-A Fellows Gear Shaper.
612-A Fellows Gear Shaper.
No. 64 Fellows Gear Shaper.

Grinders
6"x18" Norton Type C Plain (1943).
10"x18" Norton Type C Plain Hyd. Cam Gdr.
10"x36" Norton Type C Grinder.
10"x36" Norton Type C Cam Grinder.
14"x48" Landis Type C Plain Gdr.
16"-24"x168" Norton Type C (1942).
B-24—25" Chuck Arter Surf. Gdr.
TG615 J & L Thread Gdr.

Internal Grinders
No. 1109 Bryant Internal Gdr. (1951).
No. 5 Bryant Internal Grinder.
No. 5B Bryant Internal Grdr.
No. 16-16 Bryant Int. Grinder.
No. 16-28 Bryant Int. Grinder.
No. 24 L-36 Bryant Hyd. Int. Gdr.
No. 16 A-28 Bryant Internal Grinder.
No. 24-26 Bryant Int. Grinder.
No. 24-36 Bryant Internal Grinder.
No. 81 Heald Internal Centerless.
No. 16-36" Blanchard Vertical Surf. Grinder.
72-A5 Heald Int. Gdr. (1942).

Hill-Clarke Norton Type Motor Driven Grinders
10"x36" Centers. 14"x36" Centers.
10"x72" Centers. 14"x50" Centers.
10"x96" Centers. 14"x72" Centers.
18"x96" Centers. 14"x96" Centers.
18"-30" gap x 96" Centers.
26"x96" Norton.

Hones
Model H-2 Micromatic Horiz. Hone.
Model 200-HS-Dbl. End Micro. Horiz.
Model H-7 Micromatic Vert. Hone.
No. 306-H Barnes Vertical Hone.

Lathes
R-14 Lo-Swing Automatic Lathe.
18"x6' Am. Geared Head Lathe.
18"x8' Lodge & Shipley Grd. Hd.
27"x12' American Geared Hd. Lathe.
27"x12' centers LeBlond Lathe.
36"x18' Putnam Grd. Hd. M.D.

Turret Lathes
No. 5W Acme Tur. Lathe (Late).
No. 2 Warner & Swasey Geared Head.
No. 3AL Gisholt, Cross-Slide Turret.
No. 3 Warner & Swasey Turret Bar Feed.
No. 4A Warner & Swasey Turret.
No. 6 Warner & Swasey, cone head.
2½"x24" Jones & Lamson.
18" Libby, M.D.
No. 4A Warner & Swasey (1944).
No. 4A Warner & Swasey, Taper, Cross-sliding Turret (1942).

Planers
48"x36"x14' Gray, 2 Heads.
48"x48"x12' Cincinnati, 2 Heads.
60"x48"x27' American, 4 Heads.

Milling Machines
No. 08 Cincinnati Vert. (1942).
No. 12 Cincinnati Pl. Auto.
4" Taylor & Fenn Duplex Spline.
10"x48" Hanson-Whitney Thrd. Mill.
10"x60" Pratt & Whitney Thrd. Mill.
12"x102" Mod. HT Lees Bradner Thrd. Mill.
54"x30"x16' Ingersoll Slab Mill.

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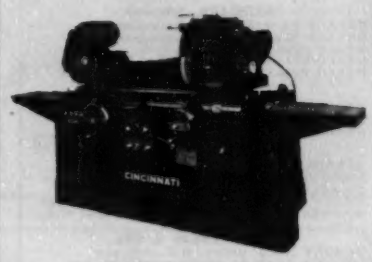

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#5 Late Type Gisholt Turret Lathe—Serial #849-36
No 47 Heald Single End Borematic — Serial #4646
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ACME GRIDLEY R6, 1⅝", 6-spindle; late type
CONOMATIC 1¼, 6-spindle; M.D., late type
CLEVELAND 3¾", Model "T" Single spindle
CLEVELAND 5", Model "A", single spindle; late
NEW BRITAIN GRIDLEY Model 605; 6-spindle chucker; latest type; new 1943.

BROACHES
COLONIAL VGI-10-48 Vertical; Hydraulic; late
LAPOINTE 10-54" Vertical. Model SRV; new 1947

DRILLS
AMERICAN 4' arm 11" col. "Hole Wizard", late
AMERICAN 5' arm 11" col. "Hole Wizard", late
AMERICAN 5' arm 13" col. "Hole Wizard", late
NATCO Model D4B arranged for 60 spindle; late
NATCO Model E5 arranged for 12 spindles; late

GEAR EQUIPMENT
FELLOWS #6, 6IA, 75 H.S. Gear Shaper; late
GLEASON 12" Straight Bevel Gear Generator
GLEASON 3" Spiral Gear Generator; late type
GLEASON #17 Spiral Bevel Hypoid Gear Grinder
GLEASON #24 Straight Bevel Gear Generator; late
BARBER COLMAN Type "A" Gear Hobber; late
GOULD & EBERHARDT #12-H Gear Hobber; late
GOULD & EBERHARDT #120-H Double head Universal; late type

GRINDERS, Cyl. Plain
CINCINNATI 10"x48" Plain "Filmatic"; late type
LANDIS 10"x18" type CC Plain, Hydraulic, late
LANDIS 14"x72" Plain type "C" Plunge; late type
NORTON 4"x12" Model CTU Plain, year 1953
NORTON 6"x18" Type "C" Plain; late type

GRINDERS, Internal
BRYANT #5, #16-C-16 Hydraulic; late type
BRYANT #24-30" Hydraulic; late type
HEALD #70A Int. M.D., late type
HEALD #81 Plain chuck type; New 1947
HEALD #72A5 Plain & "Gagomatic"; late type

GRINDERS, Surface
ABRASIVE #34, 8"x24" table; late type
BLANCHARD #11, Vert. Rotary; 16" chuck; late
HEALD #22 Rotary, 12" chuck; M.D., late.

LATHES, Turret
BARDONS & OLIVER #3 Univ. Ram Type; late
GISHOLT #1L and #2L Saddle type; Timken; late
GISHOLT #3 Universal ram type; M.D., late
MOREY #2, #3, #4 ram type; Timken; latest type
WARNER & SWASEY #5 Univ. ram type; M.D., late

LATHES, Engine & Mfg.
HENDEY 24"x36" centers; M.D., late type
LODGE & SHIPLEY 14"x30" centers; late type
MONARCH 12"x30" centers; Model CKK; late type
NILES 30"x30' bed, single end boring, "Time Saver"; late type
PRATT & WHITNEY 16"x30" centers; Timken; late
REED PRENTICE 14"x54" centers; Timken; late type
SUNDSTRAND 10"x60" centers; automatic; late type

PLANERS
DETRICK & HARVEY 48"x48"x16'; 4 hds; hydr. PRT; DC; Reversing
GRAY 36"x36"x10' "Maximim Service" 4 hds; PRT; DC; Reversing
GRAY 48"x48"x10' "Maximum Service" 4 hds; PRT; DC; Reversing
LIBERTY 144"x70"x48' adj. openside; box table; 4 hds; vari-voltage; PRT; New 1940
NILES-BEMENT-POND 72"x72"x30'; 4 hds; PRT; DC; MD

PRESSES
BLISS #8 Straight side 135-ton cap. 100" between uprights; M.D.
BLISS #410A, 525-ton double action toggle drawing press, with or without cushions; M.D.
NATIONAL #3 "Maxi-Pres", 1000-ton cap. H.S. Forging Machine; M.D.
SHAW 250-ton Hydraulic flanging press; late
WATERBURY FARREL #9, 125-ton cap., M.D.

SHAPERS and SLOTTERS
DILL 16" Slotter; motor drive
GOULD & EBERHARDT 32" H.S. Shaper; M.D.
PRATT & WHITNEY 6" & 16" Vertical; M.D.
ROCKFORD 36" Vert. Hydraulic Slotter; late

MILLING MACHINES, Plain
KEARNEY & TRECKER Model 2HL; M.D., late
KEARNEY & TRECKER 4H Plain, Timken; late

MILLING MACHINES Thread
HALL Style "D" Planetary; late type
LEES BRADNER #LT 6"x36"; #HT 12"x24"; #HT 12"x36" centers; late type
MOREY 12"x36" and 12"x160" centers; late type

MILLING MACHINES, Universal
CINCINNATI #3 Dial Type, Timken, M.D., late
KEARNEY & TRECKER #3K; Timken; late type
VAN NORMAN #26 and #36 ram type; Timken; late

MILLING MACHINES, Vertical
CINCINNATI 9-B Vertical; Timken; late type
CINCINNATI #3 Dial Type; High Speed, New 1953

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36"x12' centers AMERICAN Heavy Duty 16 Speed Geared Head Lathe, AC-MD
60"x20' NILES-BEMENT-POND Geared Head Engine Lathe, rapid traverse
No. 1L GISHOLT Saddle Type Universal Turret Lathe, preselector head, bar feed, chuck, new 1943
No. 2A WARNER & SWASEY Universal Turret Lathe, preselector head, bar feed, chuck, new 1943
No. 3A WARNER & SWASEY Turret Lathe, Timken spindle, electric chuck, tooling
No. 3 WARNER & SWASEY Universal Turret Lathe, 800,000 series
No. 4 GISHOLT Turret Lathe, Timken spindle, hardened ways
No. 2 VAN NORMAN Plain Horizontal Mill, New 1943
No. 3-34 CINCINNATI Plain Hydromatic Mill, AC-MD
No. 4 CINCINNATI High Speed Dial Type Plain Horizontal Mill, new 1942
No. 4 CINCINNATI High Power Dial Type Vertical Mill, 25 HP motor, new 1951
No. 5 CINCINNATI High Power Vertical Mill, new 1951
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INDEX OF PRODUCTS ADVERTISED IN THIS ISSUE

Abrasives, Coated 33, 264, 319

Accessories & Attachments (Machine Tool) ..... Insert Bet. 32A-32D, 32D, 82, 221, 284, 320, 322, 326

Bearings ..... 4th Cover, 230, 251, 260, 270, 277, 280B, 303, 306

Bending Machines 278

Books, Technical 294

Boring, Drilling & Milling Machines (Horizontal) ..... 3rd Cover, 14-15, 338

Boring Machines Internal . 2nd Cover, 50-51

Boring & Turning Machines (Vertical) 14-15, 112, 338

Broaching Machines 94, 161, 162, 275

Brushes 237

Cams 326

Catalogs 302

Centering Machines 104-105

Centrifugal Machines 320

Chucks 26, 83, 232, 236, 322, 324

Cleaners, Hand 189, 223

Cleaning & Drying Machines & Supplies 272

Collets 26

Compressors, Air 259

Controls Electrical 110-111, 215

Cut-Off Machines 40-41, 58, 90, 209, 234, 271, 315

Cutters, Abrasive 54-55

Diamond Wheels 164

Disintegraters, Metal 308

Dressers 35, 320, 322, 339

Drilling Machines ..... 36-37, 56-57, 59, 84-85, 93, 100, 107, 122, 201, Insert Facing 280, 282, 316

Drill Jig Bushings 114, 287

Duplicators & Pantographs ..... 3rd Cover, 221, 294, 341

Electro Plating & Polishing Equipment & Supplies 92

Engineering & Production Services 234, 247

Fabricating Methods & Services 247, 296, 301

Fasteners 64, 77, 320

Files, Hand 281

Forgings 291

Gages & Instruments ..... 16, 62, Insert Facing 65, 262, 310, 316, 318, 320, 326, 339, 342

Gear Cutting Machines 3, 6-7, 60, 286, 296

Gears, Speed Reducer, Motor Reducers 99, 229, 286, 343

Gear Testers 3, 6-7, 306

Grinders, Cutter & Tool 106, 252, 310, 314, 340, 344

Grinding Machines, Production ..... 2nd Cover, 8-9, 12-13, 18-19, Insert Bet. 64-65, 80D, 108, 164, 213, 216B, 319, 324, 344

Grinding Wheels 27, 29, 30-31, 54-55, 72-73, 92, 253, 320

Heads, Drilling, Grinding & Tapping 48-49, 322, 326, 338

Heat Treating Equipment & Supplies 70-71, 80A, 252, 317, 340

Honing Machines 116

Hydraulic & Pneumatic Parts & Equipment 28, 258, 292

Jig Borers 78-79, 276, 284, 299, 307

Lapping Machines 18-19, 242-243

Lathes, Automatic 38, 90, 94

Lathes, Engine ..... 3rd Cover, 42-43, 67, 80, 102, 193, 227, 256, 323, 343

Lathes, Turret 22-23, 82, 90, 94

Lubricants, Cutting Fluids, Quenching Oils & Solvents 39, 120-121, 166, 217, 234, 245, 265, 283, 288, 295, 310

Lubricating Systems & Equipment 205

Machines, Super Finishing 95

Marking Machines, Tools, & Supplies 316

Materials, Cutting & Forming 32, 66, 68, 168, 246, 248B, 267, 297, 309, 325

Materials of Manufacture 65, 98, 125, 207, 230, 239, 263, 297, 304

Materials Handling Equipment 219, 244, 246, 339

Millers, Die Sinkers, Profilers 4-5, 20-21, 52, 89, 104-105, 241, 316, 325

Motors, Electrical ..... Insert Bet 80A-80D, 211

Oil Purifiers 320

Power Transmission 17, 228, 279

Presses, Forging & Forming Equipment & Supplies 40-41, 58, 61, 88, 195, 197, 209, 231, 233, 234, 252, 254, 273, 280, 282, 286, 294, 296, 306, 315, 318, 320

Production, Inventory & Tool Control 248

Pumps, Circulating 268, 300

Riveting Machines 249, 280, 306

Rust Preventives 338

Safety & Welfare Equipment 311, 326

Saw Blades 86, 320

Sawing Machines 52, 86, 118, 255, 306, 318

Scrap Handling Equipment & Supplies 321

Screwdriving Machines 259

Screw Machines; Chucking Machines 34, 50-51, 63, 87, 240

Shapers, Slotters, Keyseaters 52, 128, 268, 305, 322, 326

Sorting Machines 321

Special Machine Tools 69, 122, 191, 199, 238

Spindles, Machine 225

Stampings 250

Swaging Machines 269, 293

Tapping Attachments 48-49, 312

Tapping Machines 36-37, 312, 318

Thread Cutting Machines 10-11, 101, 285

Thread Rolling Machines & Tools 126, 226

Tools, Cutting ..... 24-25, 32A, 44-45, 46, 48-49, 53, 60, 76, 81, 91, 94, 103, 109, 162, 187, 203, Insert Facing 216, 238, Insert Facing 248, 257, 266, 274, 280, 285, 290, 298, 302, 306, 316, 323, 324, 325

Tools, Hand 284, 321

Tools, Measuring 314

Tools, Portable 107, 259, 261

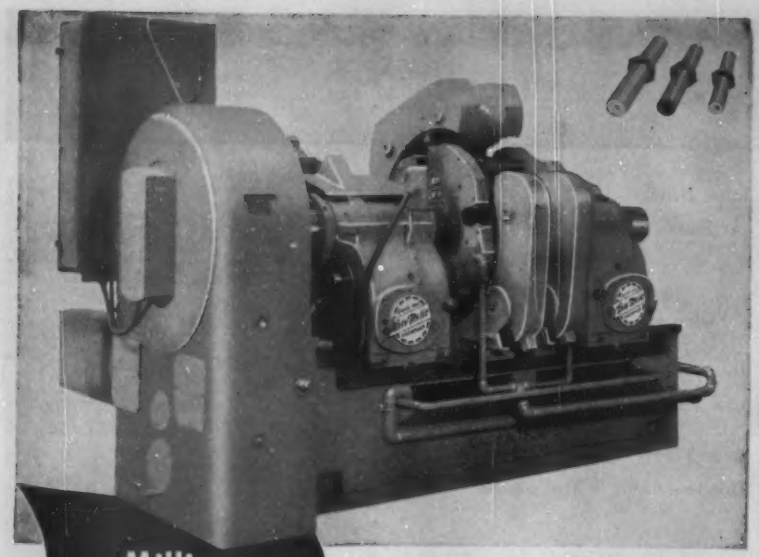
Turret Attachments, Lathe 284

Used & Surplus Equipment 328-335

Vises 35, 342

Welding & Cutting, Brazing & Soldering Equipment & Supplies 74-75, 96-97, 235, 289, 313

Wiping Material 223



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INDEX TO ADVERTISERS

This index is published as a convenience to the readers. Every care is taken to make it accurate, but AMERICAN MACHINIST assumes no responsibility for errors or omissions.

	Page
Abbey Etna Company	269
Abrasive Products Inc.	264
Acromark Company	316
Aetna Ball & Roller Bearing Co. Div. Parkersburg-Aetna Corp.	303
Affiliated Machine & Tool Co.	326
Air Reduction Sales Company Div. of Air Reduction Inc.	74-75
Alemite	205
Allied Products Corp.	301
Allis-Chalmers Manufacturing Company	80A, Insert Bet. 80A-80D
American Brass Company	263
American Chain & Cable Co., Inc.	244, 318
American Chain Div. American Chain & Cable Co., Inc	244
American Optical Co.	311
American Sip Corporation	78-79
American Steel & Wire Division	98
American Steel Foundries, King Machine Tool Division	112
American Tool Works	59
Ames Company, B. C.	262
Apex Tool & Cutter Co. Inc.	306
Armco Steel Corporation	125
Armstrong-Blum Mfg. Co.	86
Armstrong Bros. Tool Co.	32D
Aro Equipment Corporation	107
Atlantic Refining Company	217
Austin Industrial Corp.	52
Avey Drilling Machine Co.	122
Ball & Roller Bearing Company	306
Barber-Colman Company	60
Bardons & Oliver Inc.	90
Barrett Co, Leon J.	320
Bath Co. Inc., John	76
Bay State Abrasive Products Co.	72-73
Beatty Machine & Mfg. Co.	231
Behr-Manning Corp.	33
Besly-Wells Corporation	213
Bethlehem Steel Company	267
Bick Inc., Hans C.	234
Bilgram Gear & Machine Company	286
Black & Decker Mfg. Co.	261
Black & Webster Inc.	280
Blake Co., Edward	314
Blanchard Machine Co.	80D
Boye & Emmes Machine Tool Co	227
Bristol Brass Corp.	239
Brown & Sharpe Mfg. Co.	Insert Bet. 64-65
Bryant Chucking Grinder Co.	50-51
Buffalo Forge Co.	282
Bullard Co.	Insert Bet. 32A-32D
Bunting Brass & Bronze Co.	230
Cameron Iron Works Inc.	291
Carborundum Company	54-55

INDEX TO ADVERTISERS

	Page
Card Mfg. Co., S. W.	81
Carlton Machine Tool Company	84-85
Carpenter Steel Company	309
Carroll & Jamieson Machine Tool Co.	343
Chase Brass & Copper Co., Inc.	304
Chicago-Latrobe Company	302
Chicago Quadrill Company	322
Cincinnati-Bickford Tool Co.	93
Cincinnati Gear Co.	343
Cincinnati Milling Machine Co.	4-5
Cincinnati Milling Machine Co. Grinding Wheels Division	27
Cincinnati Planer Company	14-15
Cincinnati Shaper Company	40-41, 128
Cleveland Crane & Engineering Co.	209
Cleveland Twist Drill Co. Insert Facing	248
Clifton Hydraulic Press Co.	286
Climax Molybdenum Co. of New York	310
Colonial Broach Company	94
Columbia Div. Lodge & Shipley Company	58
Columbia-Geneva Steel Div	98
Columbia Tool Steel Company	246
Columbus Die-Tool & Machine Co.	296
Cone Automatic Machine Co.	63
Covel Manufacturing Company	47
Crane Packing Co.	242-243
Crucible Steel Co. of America	32
Curtis Pneumatic Machinery Div. Curtis Mfg. Co.	28
Danly Machine Specialties Inc.	61
Davis & Thompson Co.	338
Davis Boring Tool Div. Giddings & Lewis Machine Tool Co.	32A
Davis Keyseater Company	322
Denison Engineering Company	197
Detroit Tap & Tool Co.	46
DeVlieg Machine Company	299
Do All Company	255
Dodge Manufacturing Corporation	279
Duria-Werke K. G.	325
Eastern Machine Screw Corporation	326
Edlund Machinery Company	316
Eisler Engineering Co., Inc.	326
Elastic-Stop Nut Corp.	77
Elox Corporation of Michigan	308
Engelberg Huller Company	319
Errington Mechanical Laboratory	312
Ex-Cell-O Corporation	114
Falcon Tool Co.	298
Farrel Birmingham Co., Inc.	99
Federal Machine & Welder Company	254
Federal Press Company	195
Fellows Gear Shaper Company	6-7
Ferracute Machine Company	273
Foote-Burt Company	161
Forkardt K. G., Paul	324
Fosdick Machine Tool Company	56-57
Gallmeyer & Livingston Co.	344
Gardner Machine Co.	29
General Electric Apparatus Dept.	70-71, 110-111

(*Continued on page* 340)

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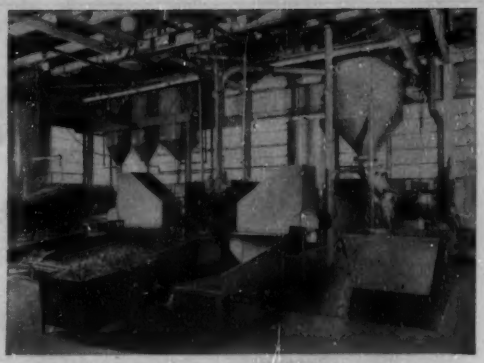

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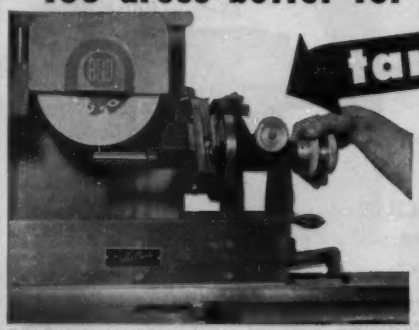

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INDEX TO ADVERTISERS

(Continued from page 339)

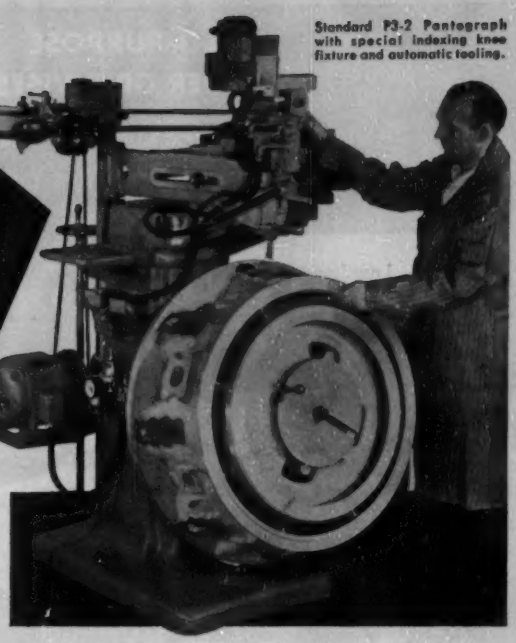
	Page
Gerotor May Corporation	300
Giddings & Lewis Machine Tool Company	14-15
Gisholt Machine Company	95
Gleason Works	3
Gorham Tool Co.	109
Gorton Machine Co., George	341
Goss & DeLeeuw Machine Company	240
Grant Gear Works Inc.	286
Grant Mfg. & Machine Company	306
Greenfield Tap & Die Corp.	Insert Facing 216
Grob Brothers	318
Hanson-Whitney Div. Whitney Chain Co.	285
Hardinge Brothers, Inc.	26
Hartford Special Machinery Co.	69
Haynes Stellite Co., Div. Union Carbide & Carbon Co.	66
Heald Machine Company	2nd Cover
Heller Brothers Co.	281
Heller Machine Co.	89
Hirschmann Co., Carl	307
Hisey-Wolf Machine Company	310
Hommelwerke G.M.B.H.	325
Hones, Inc., Charles A.	340
Houghton & Co., E. F.	295
Hy-Pro Tool Co.	203
Illinois Tool Works	257
Industrie Werke A. G.	326
Ingersoll-Rand Co.	259
J & S Tool Co. Inc.	35
Jacobs Mfg. Company	83
Jahn Manufacturing Co., B.	247
Jarvis Co., Charles L.	48-49
Johnson & Bassett Inc.	294
Johnson Bronze Company	270
Jones & Lamson Machine Company	38, 82
Kaufman Mfg. Co.	318
Kearney & Trecker Corp.	20-21
Kempsmith Machine Company	241
King Machine Tool Div. American Steel Foundries	112
Knight Machinery Co., W. B.	276
Laminated Shim Co., Inc. Shim Div	250
Landis Machine Company	10-11
Landis Tool Company	12-13
LaPointe Machine Tool Company	275
Last Word Sales Company	322
LeBlond Machine Tool Co., R. K.	42-43
Lees-Bradner Company	101
Lehigh Foundries Inc.	221
Leland-Gifford Company	201
Lewis Welding & Engineering Corp.	313
Linde Air Products Div. Union Carbide & Carbon Corp.	289
Link-Belt Co.	17
Linley Brothers Co.	284
Lobdell United Company	252

INDEX TO ADVERTISERS

	Page
Lodge & Shipley Company	102
Luers, J. Milton	320
M. B. I. Export & Import Ltd.	342
Mallory & Co., Inc., P. R.	235
Manco Mfg. Co.	249
Maschinenfabrik Lorenz A. G.	324
Matra-Werke GmbH	323
Mattison Machine Works	216B
McCaskey Register Div. Victor Adding Machine Company	248
McGill Mfg. Co	277
McGraw-Hill Book Co., Inc.	294
McKenzie Engineering Company	321
Micromatic Hone Corp.	116
Miller Fluid Power Co.	292
Mitts & Merrill	326
Morey Machinery Co., Inc.	316
Morris Machine Tool Co.	300
Morse Twist Drill & Machine Co.	24-25
Motch & Merryweather Machinery Co.	118
Nassovia GmbH	325
National Acme Company	34, 87
National Automatic Tool Co.	36-37
National Broach & Machine Co.	162
National Conveyor Co.	339
National Machine Tool Company	268
National Tool Company	91
National Tube Division	98
National Twist Drill & Tool Co	45
Nebel Machine Tool Company	80
Nelco Tool Company	266
New Britain Machine Company, The	3rd Cover
Newman Co., L.	320
Nice Ball Bearing Company	280B
Norton Company	18-19, 30-31, 92
Oakite Products Inc.	272
Ohio Knife Company	271
Oliver Instrument Company	106
O'Neil-Irwin Mfg. Co.	234
Orban Co. Inc., Kurt	296
Osborn Mfg. Co.	237
Ottemiller Co., Wm. H.	320
Palmer-Shile Company	246
Peerless Production Co.	199
Perfex Gage & Tool Co	339
Philadelphia Gear Works	229
Pines Engineering Co. Inc.	278
Pope Machinery Corp.	225
Production Specialties Inc.	338
Ready Tool Company	322
Reed Rolled Thread Die Company	226
Reeves Pulley Co.	228
Reich, Mfg. Co., J. R.	320
Reid Brothers Co., Inc.	108
Reiff & Nestor Company	290
Republic Steel Corp.	248B
Revere Copper & Brass Inc	207
Rivett Lathe & Grinder Inc.	67

(Continued on page 342)

This is GORTON Pantography



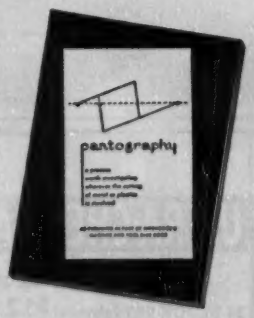
Standard P3-2 Pantograph with special indexing knee fixture and automatic tooling.

...Ready to Help You

Photo shows a standard P3-2 profiling ports in an aircraft part, a large aluminum-alloy casting. The sides of each port are parallel; one end has a true radius, the other end is parabolic. A combination of other methods would do the cutting in hours, but the P3-2, with an automatic cutting cycle, finishes each port in 2.3 minutes.

Improve Production and Lower Costs

Gorton tracer-controlled equipment does efficient profiling, routing, die sinking, mold cutting, counterboring, chamfering, grooving, graduating, engraving and many other standard or special operations. You can expect high accuracy and high surface finish, whether your work involves metals or plastics in flat, uniformly curved, cylindrical or irregular shapes.



Enlarged templates, masters or patterns, all quickly and easily made, give Gorton Pantographs advantages of increased accuracy through reduction ratios. Work pieces range in size from the diameter of a dime to 10 feet. Cutting cycle is accomplished manually or automatically.

Fill out and mail the coupon for your copies of the Gorton catalog and the informative booklet, "Pantography."

GEORGE GORTON MACHINE CO.

1506 Racine St., Racine, Wis., U.S.A.

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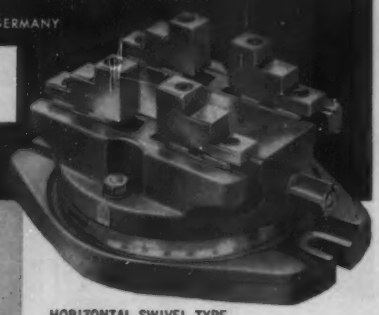

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INDEX TO ADVERTISERS

(Continued from page 341)

	Page
Rockford Machine Tool Company	305
Rohde & Dorrenberg	323
Ruthman Machinery Company	268
Ryerson & Sons Inc., Joseph T.	168
S. K. F. Industries, Inc.	260
S. P. Manufacturing Corp.	258
Sales Service Machine Tool Co.	306
Scherr Co., Inc., George	306, 314, 342
Scott Paper Company	223
Severance Tool Industries Inc.	274
Sewall Mfg. Company, E. R.	286
Shear Speed Chemical Products Div. Michigan Tool Co.	39
Sheffield Corp.	126
Sheldon Machine Company	256
Shore Instrument & Mfg. Co., Inc.	316
Sidney Machine Tool Company	198
Simonds Abrasive Co.	253
Simonds Saw & Steel Co.	68
Sinclair Refining Co.	245
Skinner Chuck Company	236
Snow Mfg. Co	187
Snyder Tool & Engineering Co.	191
South Bend Lathe Works	284
Square D Company	215
Standard Electrical Tool Co.	340
Standard Oil Co. of California	283
Standard Oil Co. (Indiana)	120-121
Standard Pressed Steel Co.	64
Standard Tool Co.	53
Steelweld Machinery Division Cleveland Crane & Engineering Co.	209
Stephens-Adamson Mfg. Co. Sealmaster Div.	251
Sterling Electric Motors Inc.	211
Stevens Walden Inc.	321
Stewart-Warner Corp	205
Stuart Oil Co., Ltd. D. A.	265
Sugar Beet Products Co.	189
Sundstrand Machine Tool Company	104-105
Sun Oil Co.	166
Supreme Products, Inc.	232
Surface Combustion Corp.	317
Swanson Tool & Machine Products Inc.	280
Sweet's Catalog Service Div. F. W. Dodge Corp.	302
Taft-Peirce Mfg Company	62
Tennessee Coal & Iron Div.	98
Threadwell Tap & Die Corp.	103
Timken Roller Bearing Co.	4th Cover
Torrington Company	293
Union Carbide & Carbon Corp.	66, 289
United States Steel Corporation	98
United States Steel Export Co.	98
United States Steel Supply Div. United States Steel Corp.	65, 98, 297
Universal Engineering Corp.	287
V & O Press Co. Div. Emhart Mfg. Co.	306
Vaill Engineering Company	294
Van Keuren Co	16

INDEX TO ADVERTISERS

	Page
Van Norman Company	8-9
Walker-Turner Div. Kearney & Trecker Corp.	Insert Facing 280
Waltham Machine Works	318
Warner & Swasey Company	22-23
Waterbury Farrel Foundry & Machine Company	233
Weldon Tool Company	316
Westinghouse Electric Corp.	96-97
White & Bagley Company	288
Wickman Manufacturing Company	164
Willey's Carbide Tool Co.	280
Williams & Co., J. H.	284
Williams White & Company	315
Wilson Co., K. R.	88
Wilson Mechanical Instrument Co.	318
Winter Brothers Company	44
Wolverine Tool Co.	326
Woodruff & Stokes	238
Yale & Towne Manufacturing Co.	219
Zeh & Hannemann Company	320

(Classified Advertising) SEARCHLIGHT SECTION

H. E. Hilty, Mgr.

EMPLOYMENT	
Selling Opportunities Offered	327
Employment Services	327
SPECIAL SERVICES	
Contract Work	328
General Pattern Works	328
O.K. Tool Co., Inc.	328
Tilp, Inc., J. G.	328
Rebuilding	335
EDUCATIONAL	
Books	327
BUSINESS OPPORTUNITIES	
Offered	327
EQUIPMENT (Used or Surplus New)	
For Rent	333
For Sale	328-335
WANTED	
Equipment	328

ADVERTISERS INDEX

Aaron Machinery Co., Inc.	330
Ball Machinery Co.	334
Bennett Machinery Co.	334
Botwinik Bros. of Mass, Inc.	332
Brownell Machine Tools, Inc., Hazard	333
Currier Machine Sales	330
Dony Machinery Co.	330
Eastern Machinery Co.	331
Electric Equipment Co.	332
Falk Machinery Co.	329
General Services Administration	328
Hasco Machinery Co.	333
Hill-Clarke Machinery Co.	333
Hyman & Sons, Jos.	333
Indianapolis Machinery & Supply Co.	332
Lagoe Oswego Corp.	335
Machine Tool Publications	327
Miles Machinery Co.	332
M & N Hydraulic Press Co.	332
Morey Machinery Co., Inc.	334
National Cooperage Co.	332
National Machinery Exchange	334
O'Connell Machinery Co.	334
Peacock Corp.	327
Pettler & Son, P.	328
Springfield Auction Co.	330
Triplex Machine Tool Corp.	335
United Machinery and Tool Corp.	330
Wigglesworth Industrial Corp.	335
Wigglesworth Machinery Co., J. D.	330
Williams, Edward Hale	333

To everyone this is a sign of good luck

And to smart gear users this CINTI is a sign of *good* gears.

CINTI "Gears... Good Gears Only"

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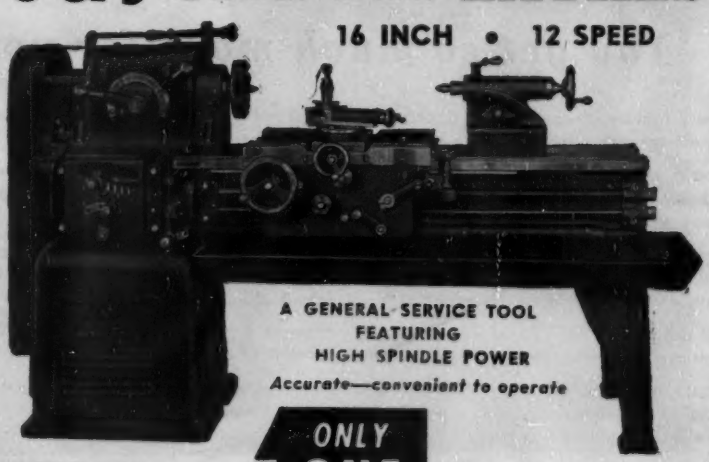

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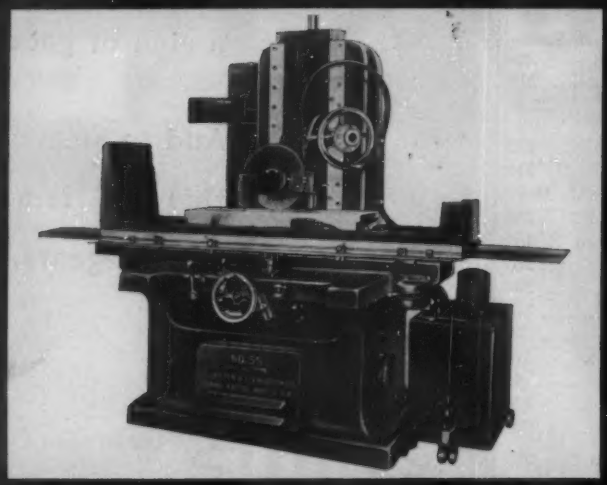

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Every feature of each Grand Rapids Hydraulic Feed Surface Grinder is designed for extra value, extra accuracy, extra high-speed performance.

You get a one-piece column and base. A single massive casting for vibrationless rigidity and permanent alignment between cross travel ways and upright head ways.

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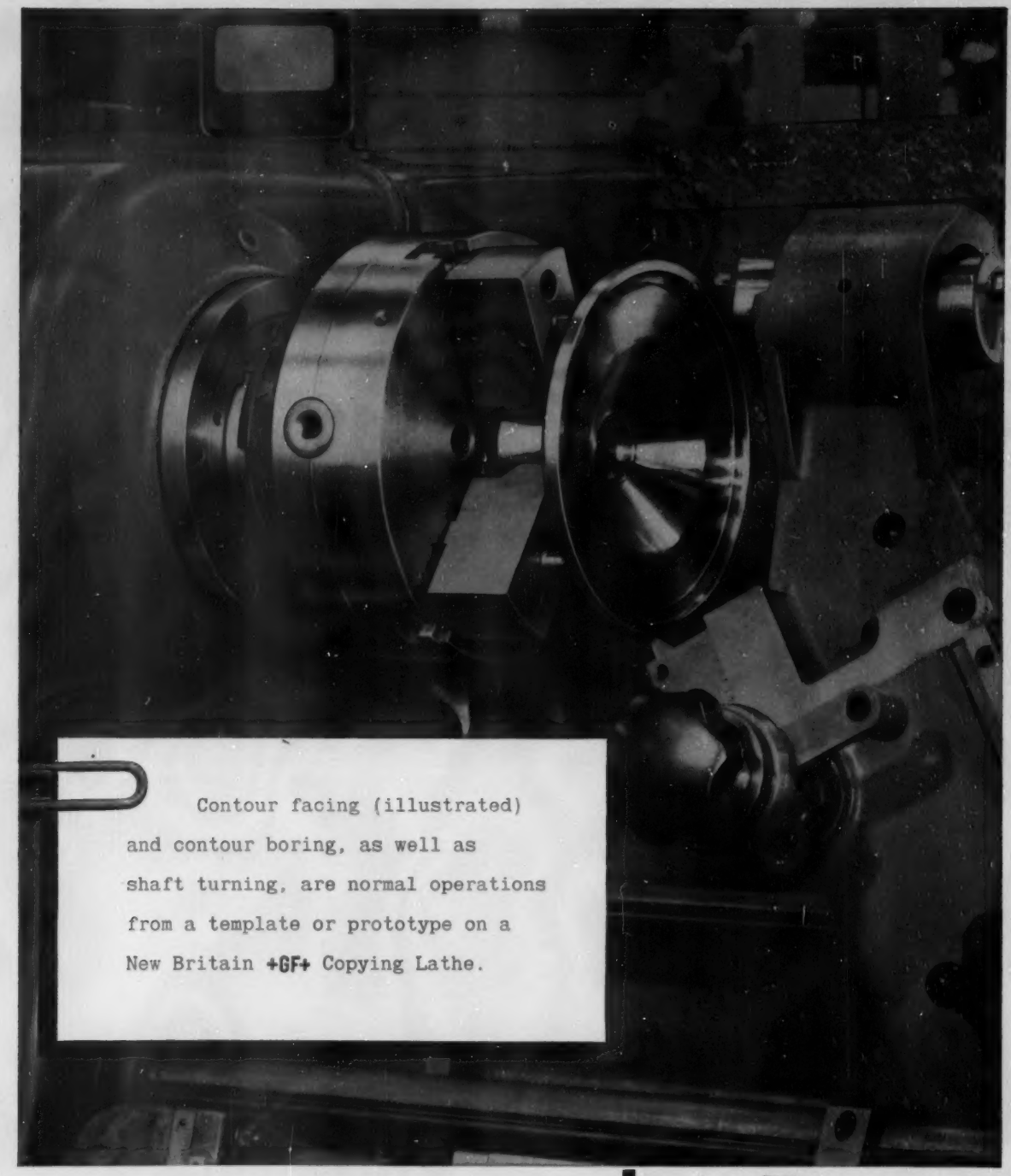

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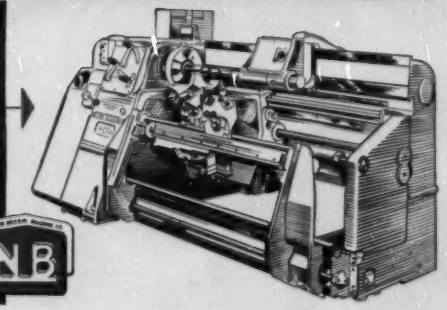


New Cleveland high speed automatic gets increased precision from TIMKEN® bearings in semi-flexible mounting

DESIGNED to be the "work horse" of many shops, this 2½" Model AW automatic, built by the Cleveland Automatic Machine Company, Cincinnati, Ohio, is not only precise, it's versatile as well.

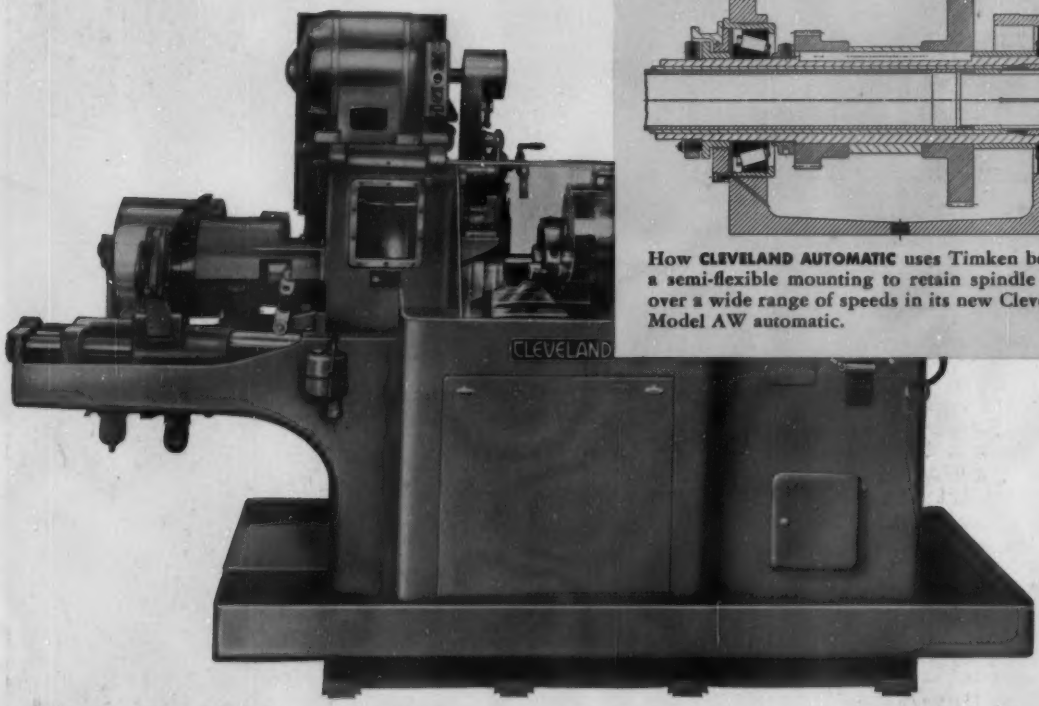
To accommodate its wide range of spindle speeds—40 in all—ranging from 69 to 1920 RPM, and to insure precision at any speed, Cleveland mounts the spindle on Timken® bearings in semi-flexible mounts. This permits any expansion during high speed operation without affecting accuracy.

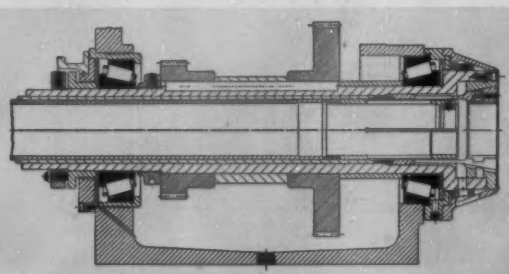
Timken tapered roller bearings hold shafts and spindles in rigid alignment. Line contact between rollers and races provides extra load-carrying capacity. Gears mesh smoothly with minimum wear under even the heaviest loads. Because of their tapered construction, Timken bearings carry radial and thrust loads in any combination.

The true rolling motion and incredibly smooth surface finish of Timken bearings practically eliminate friction. Shafts and housings are held concentric, making closures more effective.

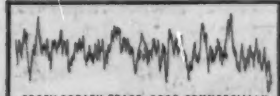
Be sure to specify Timken bearings when you build or buy machine tools. They normally last the life of the machine. Look for the trade-mark "Timken". The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.





How **CLEVELAND AUTOMATIC** uses Timken bearings in a semi-flexible mounting to retain spindle precision over a wide range of speeds in its new Cleveland 2½" Model AW automatic.



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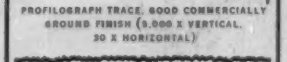
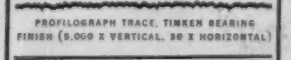


PROFILOGRAPH TRACE, TIMKEN BEARING FINISH (3,000 X VERTICAL, 30 X HORIZONTAL)



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SMOOTH TO MILLIONTHS OF AN INCH

Surface finish of high quality Timken bearing rollers and races is so smooth that it takes a profilograph to measure its smoothness. This instrument measures surface variations to a millionth of an inch, as shown at the left.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

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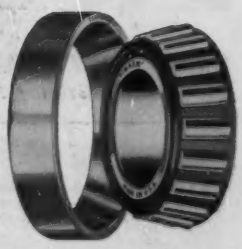

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